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Defining and Closing the Hydraulic Fracturing Governance Gap

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DEFINING AND CLOSING THE HYDRAULIC FRACTURING
GOVERNANCE GAP

GRACE HEUSNER, ALLISON SLOTO & JOSHUA ULAN GALPERIN[†]

ABSTRACT

This Article makes the case for the importance of, and authority for, local leadership on fracking governance. We do this by first surveying the public governance structure related to hydraulic fracturing at the federal level, by reviewing the traditional scope of local land use authority, and through a close examination of four states. Specifically, we describe the fracking statutes and regulations in Colorado, North Dakota, Pennsylvania, and Texas, and take a close look at how municipalities in those states have attempted to deal with fracking within their borders. We also present a list of the most salient local impacts of hydraulic fracturing, including a description of the methods we employed to catalogue these local impacts. Finally, we make explicit how local governments might use that authority to address fracking by presenting a series of case studies that demonstrate different local governance mechanisms.

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INTRODUCTION

How many articles over the past half-decade have begun by describing the dramatic growth and impacts of fracking? A lot—over 1,200, to be precise.¹ We therefore leave that description to others. The purpose of this Article, instead, is to catalogue the full public governance structure around hydraulic fracturing, to identify expressed community concerns around fracking that are uniquely local in nature, and to provide guidance to local governments on how to manage these local impacts.

Beyond questions about broad issues of climate change and America’s energy mix, much of the debate around hydraulic fracturing has centered on tensions between local communities, state governments, and industry.² These tensions can arise because local communities object to fracking, and local governments respond by banning the practice. Conversely, conflicts may arise when local communities express concerns but local governments are unprepared to act in line with their citizens’ interests.³

As recent examples in Texas and Colorado have shown, if local governments ban fracking, they risk pushback from state governments,

1. A November 2017 Westlaw search for “fracking” in law reviews and journals returns 1,243 results since January 2010.

2. See, e.g., *All Four Colorado Oil, Gas Ballot Measures Withdrawn as Promised*, DENVER POST (Aug. 5, 2014, 11:14 AM) [hereinafter *Ballot Measures Withdrawn*], <http://www.denverpost.com/2014/08/05/all-four-colorado-oil-gas-ballot-measures-withdrawn-as-promised>; Molly Hennessy-Fiske, *In Denton, Texas, Voters Approve ‘Unprecedented’ Fracking Ban*, L.A. TIMES (Nov. 7, 2014, 7:19 PM), <http://www.latimes.com/nation/la-na-texas-fracking-20141108-story.html>; Anna Driver & Terry Wade, *Texas Governor Signs Law To Prohibit Local Oil Well Fracking Bans*, REUTERS (May 18, 2015, 3:07 PM), <http://www.reuters.com/article/fracking-texas/texas-governor-signs-law-to-prohibit-local-oil-well-fracking-bans-idUSL1N0Y922Q20150518>.

3. E.g., Interview by Allison Sloto with John Smith, Partner, Smith Butz, LLC (Jan. 25, 2016) (noting that local officials in several Pennsylvania towns are struggling with the proper methods for addressing fracking because of their concern about technical and legal questions).

and this pushback can result in express preemption of local authority.⁴ Preemption occurs when there is conflict between state and local laws or actions, as described in more detail in Part III.⁵ If states support hydraulic fracturing but local governments institute local bans, states have responded by undermining the local action.⁶ Where a conflict already exists between state law and the local ban, states will institute legal actions to undo the local ban. In spring 2016, the Colorado Supreme Court, for example, addressed this exact issue.⁷ If state law does not already prevent bans, states can legislate, post hoc, to unravel the ban. In 2015, this precise scenario occurred in Texas.⁸ In either case, an outright local ban on fracking may be self-defeating, because it could ultimately result in less local control over the negative (and positive) impacts of hydraulic fracturing.

There are, of course, different perspectives on the impacts of fracking, and the appropriate nature of regulation,⁹ but there is scientific understanding about the types of impacts that hydraulic fracturing may cause.¹⁰ The process of hydraulic fracturing itself can impact

water availability, spills of chemicals at the surface, and induced seismicity that very rarely can be felt. Issues associated with the more complete process of oil and gas drilling and production . . . include all of the above as well as groundwater quality degradation, reduced air quality, noise, night sky light pollution, impacts of sand mining for use in hydraulic fracturing process, landscape changes such as forest fragmentation, surface water quality degradation from waste fluid disposal, and induced seismicity from the injection of waste fluids deep into disposal wells.¹¹

As discussed further in Part IV, there are also community and economic impacts—both positive and negative—from hydraulic fracturing and its attendant activities. While the severity of these issues vary, the breadth and diversity creates a need for some degree of safeguards.

4. *See id.*

5. *See* PATRICIA E. SALKIN, 1 AMERICAN LAW OF ZONING § 6:28 (5th ed. 2017).

6. *See, e.g.,* Jacy Marmaduke, *High Court Strikes Down Fort Collins' Halt to Fracking*, COLORADOAN (May 4, 2016, 4:13 PM), <http://www.coloradoan.com/story/news/2016/05/02/colorado-supreme-court-rules-against-fort-collins-fracking-moratorium/83798238>.

7. *Id.*

8. *See* Driver & Wade, *supra* note 2.

9. *See, e.g.,* Michael Burger, *Fracking and Federalism Choice*, 161 U. PA. L. REV. ONLINE 150, 158–59 (2013).

10. *See, e.g.,* U.S. Geological Survey, *What Environmental Issues are Associated with Hydraulic Fracturing?*, USGS, https://www.usgs.gov/faqs/what-environmental-issues-are-associated-hydraulic-fracturing?qt-news_science_products=7#qt-news_science_products (last visited Sept. 17, 2017).

11. U.S. Geological Survey, *Hydraulic Fracturing ("Fracking") FAQ*, USGS, <https://web.archive.org/web/20161210142723/https://www2.usgs.gov/faq/categories/10132/3821> (last visited Sept. 17, 2017).

Given the potential impacts of hydraulic fracturing, and the potentially self-defeating nature of local fracking bans, local governments should address the impacts of fracking through more traditional local governance mechanisms that do not pose as great a risk to local authority. Ultimately, fracking is a land use not entirely different from other industrial land uses with which local governments have long histories of governing through zoning and planning tools as well as nonregulatory techniques. The election of President Donald Trump and Republican control in Congress suggests that oil and gas exploration will continue to be an issue attracting attention at all levels of governance, and therefore, the issues surrounding fracking remain relevant.¹²

On this premise, this Article seeks to make the case for the importance of, and authority for, local leadership on fracking governance. Parts I and II give an overview of the federal and state laws that address fracking and identify gaps in both regimes. In Part III, we describe the traditional scope of local land use authority. In Part IV, we present a list of the most salient local impacts of hydraulic fracturing, including a description of the methods we employed to catalogue these local impacts. Finally, in Part V, we make explicit how local governments might use that authority to address fracking by presenting a series of case studies that demonstrate different local governance mechanisms.

I. FEDERAL HYDRAULIC FRACTURING GOVERNANCE

The current federal hydraulic fracturing regulatory system is both fragmented and incomplete. This Part identifies aspects of fracking that are covered by federal regulations and highlights many of the gaps and shortcomings in that coverage. Major federal environmental legislation—the Clean Air Act (CAA),¹³ the Clean Water Act (CWA),¹⁴ the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),¹⁵ the Endangered Species Act (ESA),¹⁶ the National Environmental Policy Act (NEPA),¹⁷ the Resource Conservation and Recovery Act (RCRA),¹⁸ the Safe Drinking Water Act (SDWA),¹⁹ and Toxic Substance Control Act (TSCA)²⁰—all nominally cover aspects of the fracking lifecycle. However, these statutes essentially all contain exemp-

12. See, e.g., Gaurav Sharma, *Making America 'Crude' Again: U.S. Oil and Gas Industry Feels the Trump Effect*, FORBES (Jan. 27, 2017, 4:36 PM), <http://www.forbes.com/sites/gauravsharma/2017/01/27/making-america-crude-again-us-oil-and-gas-industry-feels-the-trump-effect/#436b14632213>.

13. 42 U.S.C. §§ 7401–7671 (2012).

14. 33 U.S.C. §§ 1281a, 1294–1287 (2012).

15. Pub.L. 96–510, 94 Stat. 2767 (codified as amended in scattered sections of 26 U.S.C. & 42 U.S.C.).

16. 16 U.S.C. §§ 1531–1544 (2012).

17. 42 U.S.C. §§ 4321–4347 (2012).

18. 42 U.S.C. §§ 6901–6986 (2012).

19. 42 U.S.C. §§ 300f–300j (2012).

20. 15 U.S.C. §§ 2601–2629 (2012).

tions, limitations, or nuances that limit their effectiveness in protecting the environment from negative impacts of fracking.

Overall, the federal government has not enacted a comprehensive fracking regulatory regime, instead leaving the majority of regulation to “a patchwork of state policies.”²¹ There are few federal approvals required as part of a fracking operation; for example, there is no requirement to seek federal licensing approvals before beginning fracking activity.²² Yet federal regulations may apply “if the fracking operation risks harm to an endangered species, will result in a discharge to surface waters or a pretreatment facility,” or involves the transport of hazardous chemicals.²³ Moreover, federal regulations may also apply when the operation includes methane or hazardous air pollutant emissions.²⁴ Still, fracking operations may avoid regulation under some of these regulatory frameworks because of explicit exemptions.²⁵

As a result, if a fracking operation and its ancillary activities do not fall into one of these federal regulatory systems, then no federal approval is needed under any environmental law.²⁶ For example, if a fracking project does not trigger requirements to obtain federal approvals under any of the federal environmental laws, there will not be a corresponding requirement to undertake an environmental review under NEPA or obtain a state permitting certification under the CWA.²⁷

The following Sections will provide an overview of the major federal environmental laws and analyze the degree to which these statutes address hydraulic fracturing.

A. Clean Air Act

The CAA seeks to decrease air pollution, but until recently, the CAA and accompanying administrative regulations did not address fracking directly. In 2012, the Environmental Protection Agency (EPA) instituted a new rule integrating fracking into the ambit of CAA regulation.²⁸ That rule encompassed several aspects of fracking. First, EPA set “[N]ew [S]ource [P]erformance [S]tandards (NSPS) for industrial categories that cause, or significantly contribute to, air pollution that may

21. Emily C. Powers, *Fracking and Federalism: Support for an Adaptive Approach That Avoids the Tragedy of the Regulatory Commons*, 19 J.L. & POL’Y 913, 940–41 (2011).

22. David B. Spence, *Federalism, Regulatory Lags, and the Political Economy of Energy Production*, 161 U. PA. L. REV. 431, 477 (2013).

23. *Id.* at 477–78.

24. *See id.* at 484.

25. *Id.* at 478.

26. *Id.*

27. *Id.*

28. Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 77 Fed. Reg. 49,490, 49,490 (Aug. 16, 2012) (to be codified at 40 C.F.R. pt. 60, 63).

endanger public health or welfare.”²⁹ The NSPS rules regulate volatile organic compound (VOC) emissions from gas wells, storage tanks, and other equipment, as well as “leaking components at onshore natural gas processing plants.”³⁰ Among other things, oil and gas wells must now have equipment (“green completions”) able to capture escaping volatile organic compound emission.³¹ EPA also promulgated “green completion” rules regulating the release of hazardous air pollutants.³² The final rule took effect on October 15, 2012.³³

More recent action demonstrates EPA’s intent to expand air pollution regulation. In November 2015, EPA issued a request for additional data and information on hazardous air pollutants that was not available in 2012.³⁴ In May 2016, EPA finalized climate-change-related updates to its 2012 green completion rule to reduce greenhouse gas emissions.³⁵ The updates add methane to the pollutants covered by the 2012 rule, as well as requirements for detecting and repairing leaks, and requirements to limit emissions from pneumatic pumps used at well sites.³⁶ The agency explains that all of these actions will reduce methane emissions and reduce air pollution, help combat climate change, and provide more guidance about CAA permitting requirements for the oil and natural gas industry.³⁷

The cumulative impact of these rules has been to mandate many onshore natural gas fracking operations take action under the CAA to address VOCs and methane emissions.³⁸

29. U.S. ENVTL. PROT. AGENCY, OVERVIEW OF FINAL AMENDMENTS TO AIR REGULATIONS FOR THE OIL AND NATURAL GAS INDUSTRY 4 (2012), https://www.epa.gov/sites/production/files/2016-09/documents/natural_gas_transmission_fact_sheet_2012.pdf.

30. Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 77 Fed. Reg. 49,490, 49,492 (Aug. 16, 2012) (to be codified at 40 C.F.R. pt. 60, 63).

31. *Id.*

32. U.S. ENVTL. PROT. AGENCY, *supra* note 29; *see also* Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 77 Fed. Reg. at 49,492; *What Are Hazardous Air Pollutants?*, EPA, <https://www.epa.gov/haps/what-are-hazardous-air-pollutants> (last visited Sept. 28, 2017) (“Hazardous air pollutants . . . [include 187 pollutants classified by EPA as those] known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.”).

33. Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews, 77 Fed. Reg. at 49,490.

34. *Actions and Notices about Oil and Natural Gas Air Pollution Standards*, EPA, <https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry/actions-and-notices-about-oil-and-natural-gas> (last updated July 12, 2017).

35. Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources, 81 Fed. Reg. 35,824, 35,824 (Jun. 3, 2016) (to be codified at 40 C.F.R. pt. 60).

36. *Id.* at 35,830, 35,844, 35,846.

37. *EPA Releases First-Ever Standards to Cut Methane Emissions from the Oil and Gas Sector*, EPA (May 12, 2016), <https://www.epa.gov/newsreleases/epa-releases-first-ever-standards-cut-methane-emissions-oil-and-gas-sector>.

38. *See id.*; *see also* *Actions and Notices about Oil and Natural Gas Air Pollution Standards*, *supra* note 34.

B. Clean Water Act

The CWA is the primary federal regulatory tool to manage surface water pollution.³⁹ Passed in 1972, the CWA set “effluent limitations and standards governing the discharge of pollutants into the waters of the United States.”⁴⁰ The CWA ensures that these standards are met by requiring that point sources that discharge into waters of the United States—including both private facilities and publicly owned treatment works—obtain a permit pursuant to the National Pollutant Discharge Elimination System (NPDES).⁴¹ Either EPA, or states and Indian tribes that have adopted an EPA-approved water program may issue these permits.⁴² Most of the states in the United States operate under EPA-approved programs.⁴³

NPDES permits implement EPA standards by setting “effluent limitations,” which “impose restrictions on the quantity or concentration of pollutants that may be discharged.”⁴⁴ These limitations are set to a floor which is based on available control technology: either the “best available technology [] for toxic [or] non-conventional pollutants [or the] ‘best conventional technology []’ for a limited number of ‘conventional pollutants’” (including “pH, biological oxygen demand, total suspended solids, fecal coliform, and oil and grease”).⁴⁵ Sources whose construction began after EPA promulgated national standards, called “new sources,” must comply with “new source performance standards” for all pollutants representing “best available demonstrated control technology” at the time of construction.⁴⁶

Theoretically, there are two ways in which EPA could regulate water. First, the agency could regulate the direct discharge of wastewater from fracking sites. Second, EPA could regulate subsurface injection of produced wastewater. The CWA does only the former: it regulates the

39. Kevin J. Garber et al., *Water Sourcing and Wastewater Disposal: Two of the Least Worrisome Aspects of Marcellus Shale Development in Pennsylvania*, 13 DUQ. BUS. L.J. 169, 183 (2011).

40. Jason Obold, *Leading by Example: The Fracturing Responsibility and Awareness of Chemicals Act of 2011 as a Catalyst for International Drilling Reform*, 23 COLO. J. INT'L ENVTL. L. & POL'Y 473, 486, 486 n.77 (2012); see also Garber et al., *supra* note 39 (stating effluent limits are generally either technology-based or water quality-based).

41. 33 U.S.C. § 1311(a) (2012) (proscribing discharge unless provided otherwise); *id.* § 1342 (outlining rules governing permits for discharge); see also Obold, *supra* note 40, at 486.

42. 40 C.F.R. § 123.1 (2017); see also Obold, *supra* note 40, at 486.

43. See Jeffrey M. Gaba, *Flowback: Federal Regulation of Wastewater from Hydraulic Fracturing*, 39 COLUM. J. ENVTL. L. 251, 283 (2014); see also NPDES State Program Information, EPA, <https://www.epa.gov/npdes/npdes-state-program-information> (last updated Feb. 6, 2017) (outlining EPA process of delegating permitting authority).

44. Gaba, *supra* note 43; see also 40 C.F.R. §§ 435.30–.34 (2017).

45. Gaba, *supra* note 43, at 284; see also 33 U.S.C. §§ 1311(b)(2)(A), 1311(b)(2)(E), 1314(a)(4), 1314(b)(4)(A).

46. 33 U.S.C. § 1316(a)(1)–(2), (b)(1)(B).

direct surface discharge of wastewater from fracking, but does not regulate the underground activities.⁴⁷

The CWA provides EPA with the authority to regulate the direct discharge of wastewater.⁴⁸ However, there are no categorical standards for the disposal of wastewater discharged from natural gas activities.⁴⁹ As a result, shale gas wastewater is generally transported to publicly owned treatment works, or private centralized waste treatment facilities⁵⁰—which may not always be properly equipped to treat hydraulic fracturing wastewater.

EPA has established a national effluent limitation for oil and gas extraction point source categories, and the applicable regulation states that “there shall be no [on-site direct] discharge of waste water pollutants into navigable waters from any source associated with production, field exploration, drilling, well completion, or well treatment.”⁵¹ However, there is an exception for “wastewater that is of good enough quality for use in agricultural and wildlife propagation.”⁵² For fracking specifically, EPA has interpreted its national effluent limitation for oil and gas extraction to apply to wastewater emitted from fracking in shale formations as well as sandstone gas facilities. However, EPA has concluded that fracking in coalbeds to produce coalbed methane is not subject to these same requirements.⁵³

As to the underground injection of discharged wastewater, the CWA has not been a successful tool for restricting the underground emission of fracking wastewater because only the actual surface discharge of fracking wastewater is subject to regulation.⁵⁴ Although one could argue that a subsurface discharge could trigger CWA if it had a link to surface pollution—for example, groundwater flowing into surface water—EPA has not enforced underground operations under the CWA.⁵⁵ Further, although some commentators argue that the CWA should not regulate groundwater,⁵⁶ the majority of hydraulic fracturing’s risk to wa-

47. See Obold, *supra* note 40, at 486.

48. 40 C.F.R. §§ 435.30, 435.32 (2017).

49. *Natural Gas Extraction - Hydraulic Fracturing*, EPA, <https://www.epa.gov/hydraulicfracturing> (last updated Dec. 30, 2016) (noting that there are “different management methods employed by industry” and describing the ways that EPA is working with industry to consider different policy frameworks for different disposal techniques).

50. *Id.*

51. 40 C.F.R. § 435.32.

52. *Natural Gas Extraction - Hydraulic Fracturing*, *supra* note 49.

53. *Unconventional Oil and Gas Extraction Effluent Guidelines*, EPA, <http://water.epa.gov/scitech/wastetech/guide/oilandgas/unconv.cfm> (last updated Aug. 7, 2014).

54. Obold, *supra* note 40, at 486.

55. Cf. Obold, *supra* note 40, at 486 (“The CWA has been successful at regulating the surface activities of hydraulic fracturing operations, but has not been and should not be the vehicle for policing underground operations.”).

56. *Id.*

ter is underground through injection.⁵⁷ Underground injection can occur at two parts of the fracking process. First, there is injection of fracking fluid to stimulate the well.⁵⁸ Second, there is often underground injection at the end of the process to dispose of produced wastewater back into the well.⁵⁹ Further, some of the most salient concerns about fracking stem from the injection of chemicals underground as part of the extraction process and into the wells themselves.⁶⁰ Thus, because the CWA does not regulate underground releases of polluted water, the Act is limited in its ability to regulate fracking.

In some respects, fracking regulations under the CWA have been eroded since 1987. In that year, Congress passed CWA amendments to exempt oil and gas exploration, production, and processing operations from permitting requirements.⁶¹ Then, in 2005, Congress further exempted onshore oil and gas facilities from stormwater permitting requirements under the CWA.⁶² Although this exemption only applies to stormwater that does not come in contact with any on-site waste it still demonstrates intent to chip away at the CWA power.⁶³

However, there has been some strengthening of fracking regulations after the 2008 Ninth Circuit Court of Appeals ruling in *Natural Resources Defense Council v. EPA*.⁶⁴ In that case, environmental groups challenged EPA's rule that exempted oil and gas construction stormwater from the CWA.⁶⁵ The Ninth Circuit Court of Appeals agreed with the environmental challengers, finding that the language of the CWA did not allow for a stormwater exemption.⁶⁶ The Ninth Circuit thus vacated EPA's rule that had exempted stormwater runoff from the CWA.⁶⁷ As a result of that decision, oil and gas construction activities discharging stormwater, even when contaminated only by sediment, must obtain an

57. John Craven, *Fracking Secrets: The Limitations of Trade Secret Protection in Hydraulic Fracturing*, 16 VAND. J. ENT. & TECH. L. 395, 408–09 (2014).

58. *Id.* at 399–400.

59. Inessa Abayev, *Hydraulic Fracturing Wastewater: Making the Case for Treating the Environmentally Condemned*, 24 FORDHAM ENVTL. L. REV. 275, 300 (2013).

60. *Id.* at 305.

61. 42 U.S.C. § 300h(d)(1)(B)(ii) (2012) (excluding from the SDWA definition of underground injection “the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities”); see Sandra Zellmer, *Treading Water While Congress Ignores the Nation's Environment*, 88 NOTRE DAME L. REV. 2323, 2359–60 (2013).

62. 33 U.S.C. § 1362(24) (2012) (“The term ‘oil and gas exploration, production, processing, or treatment operations or transmission facilities’ means all field activities or operations . . . including activities necessary to prepare a site for drilling and for the movement and placement of drilling equipment, whether or not such field activities or operations may be considered to be construction activities.”); see Zellmer, *supra* note 61.

63. See Adam Kron, *EPA's Role in Implementing and Maintaining the Oil and Gas Industry's Environmental Exemptions: A Study in Three Statutes*, 16 VT. J. ENVTL. L. 586, 596–97 (2015).

64. 526 F.3d 591 (9th Cir. 2008).

65. *Id.* at 593–94.

66. Kron, *supra* note 63, at 596–97.

67. *Nat. Res. Def. Council*, 526 F.3d at 594.

NPDES permit, as long as the well pad and access road are one acre or larger in size.⁶⁸ However, wastewater discharges containing other contaminants remain subject to the CWA permitting requirements.⁶⁹

More recently in June 2016, EPA finalized a rule to set standards for wastewater discharges produced by natural gas extraction and destined for publically owned wastewater treatment plants.⁷⁰ The agency also announced that it would discontinue rulemaking for coalbed methane extraction.⁷¹ Further limiting its regulation over fracking, EPA issued its Preliminary 2016 Effluent Guidelines Program Plan in June 2016.⁷² This plan concluded that “no additional industries warrant[ed] new or revised effluent guidelines” and so EPA is neither crafting new effluent guidelines nor revising any existing effluent guidelines.⁷³

Thus, while there have been several efforts in the last ten years to erode the CWA power and authority, the Ninth Circuit’s decision in *Natural Resources Defense Council v. EPA* has helped provide more authority for EPA to regulate broader types of contamination in wastewater. However, there is still an opportunity for EPA to more comprehensively protect waters of the United States by utilizing CWA authority to regulate subsurface wastewater disposal that has a connection to surface waters.⁷⁴

68. Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98 MINN. L. REV. 145, 200 (2013); see also Amendments to the National Pollutant Discharge Elimination System (NPDES) Regulations for Storm Water Discharges Associated With Oil and Gas Exploration, Production, Processing, or Treatment Operations or Transmission Facilities, 71 Fed. Reg. 33,628, 33,639 (June 12, 2006) (to be codified at 40 C.F.R. pt. 122) (allowing an exemption for “small construction activities”); MICHAEL LAUFFER, IMPACT OF *NATURAL RESOURCES DEFENSE COUNCIL v. U.S. EPA* (9TH CIR. 2008) 526 F.3D 591 ON THE REGULATION OF STORM WATER DISCHARGES OF SEDIMENT FROM OIL AND GAS CONSTRUCTION ACTIVITIES 1, 4 (2009), http://www.swrcb.ca.gov/water_issues/programs/stormwater/docs/public_oil_gas_memo021809.pdf.

69. See 40 C.F.R. § 435.32 (2017).

70. Effluent Limitations Guidelines and Standards for the Oil and Gas Extraction Point Source Category, 81 Fed. Reg. 41,845, 41,845 (Jun. 28, 2016) (to be codified at 40 C.F.R. pt. 435).

71. *Id.* at 41,848.

72. OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, EPA-821-R-16-001, PRELIMINARY 2016 EFFLUENT GUIDELINES PROGRAM PLAN 1-1 (2016), https://www.epa.gov/sites/production/files/2016-06/documents/prelim-2016-eg-plan_june-2016.pdf.

73. *Id.*

74. One additional potential tool to regulate fracking through the Clean Water Act may be through the portion of the Act that “authorizes permit writers to develop specific technology-based limitations on pollutants in fracking wastewater based on ‘best professional judgment’ (‘BPJ’).” Gaba, *supra* note 43, at 303.

These limitations allow the permit writer to exercise judgment in establishing permit limits appropriate to the facility. *Id.* There are two circumstances in which permit writers may set best professional judgment limitations on pollutants: First, BPJ may be invoked “if there are no promulgated national standards applicable to the permittee.” *Id.* at 304. Second, BPJ may be used if pollutants are not specifically regulated under the national standards, which “could form the basis for imposing additional technology-based limits on the discharge of fracking wastewater from private CTW [centralized wastewater treatment] facilities.” *Id.*

C. Comprehensive Environmental Response, Compensation, and Liability Act

CERCLA was created in 1980 to authorize cleanup of contaminated properties and provide a cost recovery action for litigants.⁷⁵ Any of the following elements may establish a cost recovery action under CERCLA: “(1) the defendant [is a] ‘responsible party’; (2) [] hazardous substances are disposed of at a ‘facility’; (3) there is a ‘release’ or threatened release of hazardous substances into the environment; or (4) the release causes the incurrence of ‘response costs.’”⁷⁶ A CERCLA response action is thus available where hazardous substances resulting from a federally permitted release have contaminated the surface water, soil, or groundwater.⁷⁷

Under CERCLA, the definition of “hazardous substance” includes hazardous chemicals or substances included in TSCA, with the exception of petroleum.⁷⁸ This exception also includes crude oil, or “any fraction thereof.”⁷⁹ In *Wiltshire Westwood Associates v. Atlantic Richfield Corp.*,⁸⁰ the Ninth Circuit reasoned that constituent parts of gasoline must also be excluded, or the exclusion would be meaningless.⁸¹ These constituents have been interpreted to include any distillation of petroleum, including diesel fuel and the compounds (such as benzene, toluene, ethylbenzene, and xylene) constituting diesel.⁸²

The petroleum exemption also applies to “natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel.”⁸³ Adam Kron reasons that, given the statute’s language, it may be possible to argue that the exclusion does not cover releases at modern natural gas wells.⁸⁴ This is because “the natural gas provision of the exclusion does not include the ‘any fraction thereof’ language in the petroleum provision, and it includes the modifier ‘usable for fuel.’”⁸⁵ Kron argues that, since natural gas cannot be used for fuel until after a series of processing steps to remove several “toxic constituents,” “a release of unprocessed natural gas or a release of the constituents removed by processing is not

75. Sean H. Joyner, *Superfund to the Rescue? Seeking Potential CERCLA Response Authority and Cost Recovery Liability for Releases of Hazardous Substances Resulting from Hydraulic Fracturing*, 28 J. CONTEMP. HEALTH L. & POL’Y, 111, 129 (2011).

76. *U.S. v. Alcan Aluminum Corp.*, 964 F.2d 252, 258–59 (3d Cir. 1992); see also 42 U.S.C. § 9601(22) (2012) (“The term ‘release’ means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment.”).

77. *Alcan Aluminum Corp.*, 964 F.2d at 261; see also 42 U.S.C. § 9601(10) (defining a “federally permitted release” as a discharge or emission that is allowed under a particular environmental statute given that statute’s permitted allowances or discharge limits).

78. 42 U.S.C. § 9601(14).

79. *Id.*

80. 881 F.2d 801 (9th Cir. 1989).

81. *Id.* at 805.

82. Joyner, *supra* note 75, at 130.

83. 42 U.S.C. § 9601(14).

84. Kron, *supra* note 63, at 595.

85. *Id.* at 596.

exempt and still should trigger CERCLA's liability and notification provisions."⁸⁶

CERCLA allows "any injection of fluids or other materials authorized under applicable State law [] for the purpose of stimulating or treating wells for the production of crude oil, natural gas, or water, [] for the purpose of . . . recovery of crude oil or natural gas."⁸⁷ As a result, the underground injection of fluids for fracking is a federally-permitted release under CERCLA § 101(10)(I), as long as the release is permitted at the state level.⁸⁸ Thus, fracking injection is exempt from CERCLA liability.⁸⁹

However, there remains a debate over the limits of fracking fluid exemptions from cleanup liability.⁹⁰ Scholars note that EPA has used CERCLA § 104(e) to investigate water that may be contaminated with fracking fluids.⁹¹ Further, though petroleum and gas are excluded, courts have held that liability attaches to an entire site if multiple hazardous substances, such as diesel, are inextricably mixed together such that petroleum cannot be separated from the other chemicals.⁹²

To conclude, although the injection of fracking fluids into wells is generally exempt under CERCLA,⁹³ there is some ambiguity about whether EPA has the authority to investigate water contaminated with fracking fluid. However, spills are likely not as big of a concern for local governments given their infrequency.⁹⁴

D. Endangered Species Act

Fracking operations must comply with the ESA.⁹⁵ If a species is listed under the ESA, all federal agencies are prohibited from authorizing, funding, or carrying out actions (including issuing permits) that "result in the destruction or adverse modification of [critical] habitat."⁹⁶ In 2012, a United States Geological Survey (USGS) report documented that shale gas and coalbed methane natural gas extraction practices between

86. *Id.*

87. 42 U.S.C. § 9601(10)(I).

88. *Id.*

89. Joyner, *supra* note 75, at 133–34 (noting that hazardous substances at the EPA study site have been "so commingled with petroleum that they cannot be separated" and so CERCLA liability should attach to the entire site).

90. Craven, *supra* note 57, at 410.

91. *Id.*

92. Joyner, *supra* note 75, at 133–34.

93. 42 U.S.C. § 9601(10) (2012).

94. EPA estimates that the number of spills related to hydraulic fracturing is less than one hundred per year. See OFFICE OF RESEARCH & DEV., U.S. ENVTL. PROT. AGENCY, EPA/601/R-14/001, REVIEW OF STATE AND INDUSTRY SPILL DATA: CHARACTERIZATION OF HYDRAULIC FRACTURING-RELATED SPILLS 9 (2015), https://www.epa.gov/sites/production/files/2015-05/documents/hf_spills_report_final_5-12-15_508_km_sb.pdf (cataloguing 456 spills due to fracking over six years).

95. See 16 U.S.C. § 1536(a)(2) (2012).

96. *Id.*

2004 and 2010 in two Pennsylvania counties “create[d] potentially serious patterns of disturbance on the landscape.”⁹⁷ This finding is particularly germane to the ESA because increases in habitat disturbances, such as habitat fragmentation, can have negative impacts on the populations of ESA-listed flora and fauna.⁹⁸

The ESA applies to private and public property, and proscribes both direct and indirect harms to listed species.⁹⁹ As a result, the ESA has a broad reach that can lead to extensive liability. Thus, the ESA can effectively limit local impacts of hydraulic fracturing—but a species must be listed to receive such protection.¹⁰⁰

E. National Environmental Policy Act

While NEPA nominally applies to fracking, in practice fracking operations are rarely subject to NEPA review for the reasons stated below. Established in 1969, Congress envisioned NEPA as a regulatory program that would require government agencies to consider environmental concerns by identifying the environmental impacts of federal programs and projects in an environmental impact statement (EIS).¹⁰¹ This intent was at least thwarted in part by the Energy Policy Act of 2005, which created a “rebuttable presumption” that oil and gas operations fall under a “‘categorical exception’ to the normal procedural requirements.”¹⁰² To rebut this presumption, a citizen bringing a suit must meet the high standard of “extraordinary circumstances warranting a full NEPA review.”¹⁰³ Further, even if a particular project were subject to NEPA review, the operation would have to include federal actors or support in order to trigger NEPA, and would have to be sufficiently “extraordinary” to rebut the statutory exemption. Accordingly, only in rare circumstances does NEPA apply to fracking operations. Ultimately, while NEPA review could provide substantial information on certain fracking activities, it provides more in the way of transparency and review than in creating actual fracking safeguards.

97. E.T. SLONECKER ET AL., U.S. GEOLOGICAL SURVEY, OPEN FILE REPORT 2012-1154, LANDSCAPE CONSEQUENCES OF NATURAL GAS EXTRACTION IN BRADFORD AND WASHINGTON COUNTIES, PENNSYLVANIA, 2004–2010, at 1 (2012), <http://pubs.usgs.gov/of/2012/1154/of2012-1154.pdf>; see also Kalyani Robbins, *Awakening the Slumbering Giant: How Horizontal Drilling Technology Brought the Endangered Species Act to Bear on Hydraulic Fracturing*, 63 CASE W. RES. L. REV. 1143, 1154 (2013).

98. See Robbins, *supra* note 97, at 1154–55.

99. *Id.* at 1151.

100. See, e.g., 16 U.S.C. § 1536(a)(2) (delineating protections for species that have already been listed as endangered).

101. Craven, *supra* note 57, at 410.

102. *Id.* at 410–11; see also 42 U.S.C. § 15942 (2012).

103. Craven, *supra* note 57, at 410–11 (quoting Daniel R. Cahoy et al., *Fracking Patents: The Emergence of Patents as Information Containment Tools in Shale Drilling*, 19 MICH. TELECOMM. & TECH. L. REV. 279, 313 (2013)).

F. Resource Conservation and Recovery Act

RCRA establishes a framework that “regulates hazardous waste from cradle to grave” through a specific use, transport, and disposal standards and procedures.¹⁰⁴ When Congress passed RCRA in 1976, the statute included regulation over oil and gas production and waste.¹⁰⁵ However, in 1980, Congress granted a temporary exemption to “exploration . . . [and] production” oil and gas wastes.¹⁰⁶ At that time, Congress directed EPA to study whether these wastes should be regulated under RCRA.¹⁰⁷ EPA’s study found that the regulation of oil and gas wastes was unwarranted due to relatively low risks and the costs that would be imposed on oil and gas producers.¹⁰⁸ EPA also asserted that state and other federal regulation of oil and gas wastes was generally adequate.¹⁰⁹ Since then, identifying the contents of “waste generated from oil and gas operations is not subject to federal hazardous waste regulation” under Subtitle C of RCRA.¹¹⁰

However, EPA has recognized that some oil and gas exploration and production wastes were hazardous, and that some state regulations were lacking. Instead of regulating the wastes itself, EPA provided funding to the Interstate Oil and Gas Compact Commission (IOGCC) to review state regulations.¹¹¹ In 2009, IOGCC hosted two congressional briefings on Capitol Hill attesting to the adequacy of the states’ fracking regulation writ large.¹¹² These briefings did not result in any changes to the oil and gas exemption under RCRA.¹¹³ Thus, RCRA continues to exempt waste generated from oil and gas operations.

104. *Id.* at 409.

105. James R. Cox, *Revisiting RCRA’s Oilfield Waste Exemption as to Certain Hazardous Oilfield Exploration and Production Wastes*, 14 VILL. ENVTL. L.J. 1, 2–3 (2003).

106. *Id.*

107. *Id.* at 3.

108. *Id.* at 5–6.

109. *Id.* at 5.

110. Craven, *supra* note 57, at 409. EPA exempted oil and gas from oversight in 1980, after a study concluded that oil and gas exploration and production wastes did not warrant regulation under RCRA. Gaba, *supra* note 43, at 271–72. “This conclusion was not based on [the idea] that the wastes did not contain hazardous constituents . . . , [but that] existing state and federal programs adequately addressed management of these wastes and that classifying oil and gas wastes as hazardous would result in increased administrative burdens.” *Id.* at 272–73. “[I]n 1988, EPA acknowledged that [the] exemption was ‘unwarranted.’” Cameron Jefferies, *Unconventional Bridges over Troubled Water - Lessons to Be Learned from the Canadian Oil Sands as the United States Moves to Develop the Natural Gas of the Marcellus Shale Play*, 33 ENERGY L.J. 75, 99 (2012) (quoting Hannah Wiseman, *Regulatory Adaptation in Fractured Appalachia*, 21 VILL. ENVTL. L.J. 229, 244 (2010)).

111. Hannah Wiseman, *Regulatory Adaptation in Fractured Appalachia*, 21 VILL. ENVTL. L.J. 229, 248 (2010).

112. *Issues*, INTERSTATE OIL & GAS COMPACT COMM’N, <http://iogcc.ok.gov/hydraulic-fracturing> (last visited Sept. 30, 2017).

113. *Proper Management of Oil and Gas Exploration and Production Waste*, EPA, <https://www.epa.gov/hw/proper-management-oil-and-gas-exploration-and-production-waste> (last updated Apr. 10, 2017).

G. Safe Drinking Water Act

The SDWA seeks to protect public health by regulating the nation's drinking supply¹¹⁴ through "national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water."¹¹⁵

The SDWA, passed in 1974, requires EPA to create a national maximum contaminate level when a particular contaminate "may have an adverse effect on the health of persons" and "there is a substantial likelihood that [it] will occur in public water systems."¹¹⁶ However, it is in the "sole judgment of the [EPA] Administrator [whether] regulation of such contaminant presents a meaningful opportunity for health risk reduction."¹¹⁷ Such discretion suggests that there is flexibility for the types of contaminants covered by the SDWA, but also a great deal of discretion endowed to the Administrator.

In lieu of federal agencies implementing their regulations, states may also apply to EPA for "primacy," defined by EPA as "the authority to implement the EPA's standards within an individual jurisdiction."¹¹⁸ If a state elects this option, it must submit an Underground Injection Control (UIC) proposal to EPA meeting EPA's minimum requirements.¹¹⁹ The UIC program regulates both the initial injection of fracking fluid and post-fracking injection of wastewater. EPA retains the right to take regulatory power back from a state if it determines that the state UIC program violates the SDWA.¹²⁰ As of 2015, EPA has delegated the authority to administer UIC programs to thirty-nine states.¹²¹

Despite state programs' prevalence, a 2014 Government Accountability Office (GAO) report found significant deficiencies in EPA's oversight of states' regulatory schemes.¹²² First, GAO "found that EPA was not consistently conducting annual on-site reviews of state programs, as is required by EPA's own guidance."¹²³ Second, GAO found that EPA

114. Obold, *supra* note 40, at 482.

115. Abayev, *supra* note 59, at 297 (quoting OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, EPA 816-F-04-030, UNDERSTANDING THE SAFE DRINKING WATER ACT (2004), <https://www.epa.gov/sites/production/files/2015-04/documents/epa816f04030.pdf>).

116. 42 U.S.C. § 300g-1(b)(1)(A)(i)-(ii) (2012).

117. *Id.* § 300g-1(b)(1)(A)(iii); Angela C. Cupas, *The Not-So-Safe Drinking Water Act: Why We Must Regulate Hydraulic Fracturing at the Federal Level*, 33 WM. & MARY ENVTL. L. & POL'Y REV. 605, 609 (2009).

118. OFFICE OF WATER, U.S. ENVTL. PROT. AGENCY, EPA 816-F-04-030, UNDERSTANDING THE SAFE DRINKING WATER ACT (2004), <https://www.epa.gov/sites/production/files/2015-04/documents/epa816f04030.pdf>.

119. Obold, *supra* note 40, at 482.

120. 42 U.S.C. § 300h-1(c).

121. Kron, *supra* note 63, at 618.

122. *Id.*

123. *Id.*

was not adequately updating its regulations to track state program requirements.¹²⁴

Fundamentally, fracking may impact drinking water in two primary ways. The first is when fracking fluid is injected to stimulate the well, and the second is when flowback wastewater is disposed in underground injection wells. The SDWA regulates neither.

First, the SDWA does not regulate the injection of materials into wells. Between 2000 and 2005, EPA conducted a study into coalbed methane and found that the “injection of certain extraction materials into [such] wells posed ‘little or no threat to underground sources of drinking water.’”¹²⁵ In the wake of EPA’s study, Congress passed the Energy Policy Act of 2005, which excluded most fluids used in the initial fracking injection from regulation under SDWA.¹²⁶ These amendments effectively “exempt[] fracking companies from compliance with UIC programs because their fracking fluids no longer require a permit.”¹²⁷

The only aspect of fracking regulated under the SDWA is when diesel fuel is used as a fluid to initially inject water into a recovery well.¹²⁸ In that instance, EPA does have authority to regulate the underground injection of diesel fuel through the UIC program.¹²⁹ This means that “[a]ny service company that performs hydraulic fracturing using diesel fuel must receive prior authorization from the UIC program.”¹³⁰

Second, the SDWA does not cover wastewater. The SDWA and the CWA establish minimal federal standards for management of wastewater. In Part C of the SDWA, underground drinking water sources are addressed, and the Act requires EPA to “establish and publish regula-

124. *Id.*

125. Cupas, *supra* note 117, at 606 (quoting OFFICE OF GROUND WATER AND DRINKING WATER, U.S. ENVTL. PROT. AGENCY, EPA 816-R-04-003, EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS ES-1 (2004)). “The formal battle over whether the Safe Drinking Water Act must regulate hydraulic fracturing began in 1997, when the Legal Environmental Assistance Foundation, Inc. filed a petition asking the EPA to withdraw its approval of Alabama’s underground injection program.” *Id.* “[T]he EPA’s draft study noted that over ten chemicals associated with hydraulic fracturing required SDWA regulation, nine of which exceeded the regulatory standard, however, in the final draft of the study, the EPA either completely removed or favorably altered calculations regarding most of these chemicals.” *Id.* at 614.

126. Energy Policy Act of 2005, Pub. L. No. 109-58, § 322, 119 Stat. 594, 694; *see also* Abraham Lustgarten, *Former Bush EPA Official Says Fracking Exemption Went Too Far; Congress Should Revisit*, PROPUBLICA (Mar. 9, 2011, 12:21 PM), <http://www.propublica.org/article/former-bush-epa-official-says-fracking-exemption-went-too-far> (describing the motivation behind the exemption).

127. Craven, *supra* note 57, at 407; *see also* Spence, *supra* note 22, at 449–50.

128. L. Poe Leggette et al., *Federal Regulation of Hydraulic Fracturing: A Conversational Introduction*, in 33 ENERGY & MINERAL LAW INST., THIRTY-THIRD ANNUAL INSTITUTE, 795, 824 (2012); *see also* U.S. ENVTL. PROT. AGENCY, *Class II Oil and Gas Related Injection Wells*, EPA, <https://www.epa.gov/uic/class-ii-oil-and-gas-related-injection-wells> (last updated Sept. 6, 2016).

129. *Natural Gas Extraction - Hydraulic Fracturing*, *supra* note 49; *see also* Leggette et al., *supra* note 128, at 828–29.

130. Leggette et al., *supra* note 128, at 828–29.

tions that set minimum requirements and restrictions for underground injections nationwide.”¹³¹ These include standards “for inspection, monitoring, recordkeeping, and reporting requirements.”¹³² Yet because Part C of the SDWA was specifically amended to exempt any “underground injection of” most fluids “related to oil, gas, or geothermal production,” fracking wastewater is not regulated by SDWA either.¹³³ However, EPA maintains authority over its UIC Class II wells, which “accept injection of oil and gas wastewater . . . [s]o long as fracking for oil and gas production is not involved.”¹³⁴

In 2009, Congress directed EPA to commission a new study to determine the comprehensive effects of fracking on the environment, including effects on drinking water.¹³⁵ In December 2016, EPA published the results of that study, finding that fracking can impact drinking water under certain circumstances—particularly during spills and improper disposal.¹³⁶

A final source of regulatory authority in the SDWA rests with EPA’s emergency powers: under § 1431 of the SDWA, EPA has “the power to issue emergency orders if a contaminant in an underground source of drinking water may present an ‘imminent and substantial endangerment to the health of persons.’”¹³⁷ However, because this provision applies only if there is substantial endangerment of human health, the SDWA would not protect drinking water supplies before there are negative human-health effects.¹³⁸

H. Toxic Substances Control Act and Emergency Planning and Community Right-to-Know Act

TSCA gives EPA the authority to require private companies to report the types and amounts of chemicals in their products.¹³⁹ These reporting requirements apply to companies that manufacture and/or import a chemical substance listed on the TSCA Inventory and are not otherwise exempt.¹⁴⁰ In 2014, EPA proposed a new rule mandating that companies report their usage of inorganic chemical substances—substances often

131. Obold, *supra* note 40, at 482; *see also* 42 U.S.C. §§ 300h–300h-8 (2012).

132. Craven, *supra* note 57, at 407 (quoting Rebecca Jo Reser & David T. Ritter, *State and Federal Legislation and Regulation of Hydraulic Fracturing*, 57 ADVOC. (TEX.) 31, 31 (2011)).

133. *See* Energy Policy Act of 2005, Pub. L. No. 109-58, § 322, 119 Stat. 594, 694.

134. Kron, *supra* note 63, at 617.

135. Obold, *supra* note 40, at 487.

136. OFFICE OF RESEARCH & DEV., U.S. ENVTL. PROT. AGENCY, EPA-600-R-16-236Fa, HYDRAULIC FRACTURING FOR OIL AND GAS: IMPACTS FROM THE HYDRAULIC FRACTURING WATER CYCLE ON DRINKING WATER RESOURCES IN THE UNITED STATES (2016).

137. Craven, *supra* note 57, at 407–08 (quoting 42 U.S.C. § 300i(a) (2012)).

138. *Id.* at 408.

139. Leggette et al., *supra* note 128, at 823; *see also* *Hydraulic Fracturing Chemicals and Mixtures*, EPA, <https://yosemite.epa.gov/oepi/rulegate.nsf/byRIN/2070-AJ93> (last visited Sept. 30, 2017).

140. Leggette et al., *supra* note 128, at 823.

used in fracking.¹⁴¹ The Advanced Notice of Proposed Rulemaking closed in September 2014, and the final rule has not yet been promulgated.¹⁴²

Moreover, EPA recently lowered the chemical volume that must be included in reported records in one calendar year, from 100,000 pounds to 25,000.¹⁴³ Some chemicals used in natural gas extraction are still exempt from reporting, including petroleum process streams and liquefied petroleum gas.¹⁴⁴

EPA also agreed to propose rules under §§ 8(a) and 8(d) of the Act that would require regulated parties to disclose information on “chemical substances and mixtures used in hydraulic fracturing.”¹⁴⁵ These rules would also create new transparency and access to information by requiring manufacturers, processors, commercial distributors, and other regulated entities to disclose health and safety research addressing the regulated substances.¹⁴⁶ As a result, some observers expect that “the burden of compliance would more likely fall on service companies, as opposed to oil and gas well operators.”¹⁴⁷ This would create a new degree of transparency, but would not control on-the-ground operations.

Under the Emergency Planning and Community Right-to-Know Act (EPCRA), operators must maintain material safety data sheets for certain chemicals that are stored at the drilling site above threshold quantities.¹⁴⁸ However, oil and gas operators are not required to prepare annual toxic chemical release forms, because the oil and gas industry is not one of the listed industries under the Act.¹⁴⁹ Further, although the EPCRA requires that operators provide the data sheets to local emergency planning committees upon request, it also allows operators to claim that certain chemical compositions are “trade secrets” and are thus exempt from disclosure.¹⁵⁰

On March 20, 2015, the Secretary of the Interior released final standards that would “improve safety and help protect groundwater by updating requirements for well-bore integrity, wastewater disposal and public disclosure of chemicals.”¹⁵¹ These standards would also purport-

141. See Hydraulic Fracturing Chemicals and Mixtures, 79 Fed. Reg. 28,664, 28,665–66 (proposed May 19, 2014) (to be codified at 40 C.F.R. ch. 1).

142. *Id.* at 28,664; see also *Regulatory Development and Retrospective Review Tracker: Hydraulic Fracturing Chemicals and Mixtures*, EPA, <https://yosemite.epa.gov/oepi/RuleGate.nsf/byRIN/2070-AJ93> (last visited Oct. 30, 2017).

143. Leggette et al., *supra* note 128, at 823.

144. 40 C.F.R. § 711.6(b)(1) (2017).

145. Hydraulic Fracturing Chemicals and Mixtures, 79 Fed. Reg. at 28,664.

146. Leggette et al., *supra* note 128.

147. *Id.*

148. 42 U.S.C. § 11021 (2012).

149. Wiseman, *supra* note 111, at 250 n.125.

150. 42 U.S.C. § 11042 (2012).

151. *Interior Department Releases Final Rule to Support Safe, Responsible Hydraulic Fracturing Activities on Public and Tribal Lands*, BUREAU OF LAND MGMT. (Mar. 20, 2015),

edly include “measures to target where oil and gas leasing occurs[,] and protect” “special” areas where no drilling should be permitted.¹⁵² Specifically, key provisions of the rule include improved protection of ground-water supplies by requiring a certification of

well integrity and strong cement barriers between the wellbore and water zones through which the wellbore passes; [i]ncreased transparency by requiring companies to publicly disclose chemicals used in hydraulic fracturing to the Bureau of Land Management . . . within 30 days of completing fracturing operations; [h]igher standards for interim storage of recovered waste fluids from hydraulic fracturing to mitigate risks to air, water, and wildlife; [and] [m]easures to lower the risk of cross-well contamination with chemicals and fluids used in the fracturing operation by [increasing requirements for disclosure to the Bureau].¹⁵³

The rule, initially scheduled to come into effect in June 2015, applied only to land managed by the Bureau of Land Management (BLM). As a result, it was limited to development on public and tribal lands. Yet this rule represented a significant step forward in federal regulation of hydraulic fracturing. Then-Secretary of the Interior Sally Jewell noted that “[c]urrent federal well-drilling regulations are more than 30 years old and they simply have not kept pace with the technical complexities of today’s hydraulic fracturing operations.”¹⁵⁴

However, in June of 2016, a federal judge struck down the BLM rule.¹⁵⁵ Judge Scott Skavdahl found that BLM lacked the authority to regulate energy extraction on public lands because Congress did not delegate such authority to regulate fracking to the Department of the Interior.¹⁵⁶ In looking at the text of the 2005 Energy Policy Act, Judge Skavdahl concluded that Congress had “explicitly removed the only source of specific federal agency over fracking.”¹⁵⁷ The case was appealed to the Tenth Circuit Court of Appeals, and the Tenth Circuit vacated the district court’s decision in September 2017.¹⁵⁸

<https://www.blm.gov/press-release/interior-department-releases-final-rule-support-safe-responsible-hydraulic-fracturing>; see also Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands, 80 Fed. Reg. 16,128, 16,128 (Mar. 26, 2015) (to be codified at 43 C.F.R. pt. 3160).

152. BUREAU OF LAND MGMT., *supra* note 151.

153. *Id.*

154. *Id.*

155. *Wyoming v. U.S. Dep’t of the Interior*, No. 2:15-CV-041-SWS, 2016 WL 3509415, at *12 (D. Wyo. June 21, 2016).

156. *Id.*

157. *Id.* at *11.

158. *E.g.*, Jennifer A. Dlouhy, *Federal Judge Strikes Down Obama’s Effort to Regulate Fracking*, BLOOMBERG (June 22, 2016, 8:20 AM), <https://www.bloomberg.com/news/articles/2016-06-22/federal-judge-strikes-down-obama-s-effort-to-regulate-fracking>; see also *Wyoming v. Zinke*, 871 F.3d 1133, 1146 (10th Cir. 2017) (vacating the district court’s opinion and dismissing the case without prejudice because the Trump Administration began the process to rescind the proposed regulation in 2017).

I. Gaps in Federal Regulations

The significant gap in federal fracking governance appears to be an unprincipled, relatively arbitrary one.¹⁵⁹ In some ways, this is expected, as “the regulation of oil and natural gas exploration and production in the United States has always been primarily a state matter.”¹⁶⁰ Because “economic motives drove the earliest government interventions into oil and gas production,”¹⁶¹ the federal regime did not emerge from a comprehensive endeavor to protect the environment from oil and gas activities. The gaps that have emerged in the federal regulation regime stem from the loopholes enacted throughout the past twenty-five years. These include the exemptions for oil and gas exploration from CERCLA, RCRA, and the SWDA. Such exemptions appear to have largely been political calculations,¹⁶² and not the result of a reasoned policy decisions to leave matters of primarily local concern to state and local governments.

The loopholes in federal fracking regulation might beg the question of whether the federal government is the most appropriate regulator. Some scholars argue that the federal government is not the appropriate level of government to regulate fracking.¹⁶³ These scholars have noted that not enough is currently known about the technology itself to institute a comprehensive federal regime.¹⁶⁴ Moreover, perhaps states are the best level of government to make these decisions about their oil and gas regulations, given the many intrastate effects of the technology¹⁶⁵ and tradition of local oil and gas regulation. Other arguments for state regulation include “the ability to tailor decisions to local environmental conditions; regulatory and policy innovation; adaptive management or other experimentalist or ‘new governance’ regimes; and interjurisdictional competition that can lead to economically efficient regulation.”¹⁶⁶

Others, however, have argued that the federal government is actually the better actor to regulate fracking given the widespread economic, environmental, and energy-system impacts.¹⁶⁷ With the rapid expansion

159. See Shalanda Helen Baker, *Is Fracking the Next Financial Crisis? A Development Lens for Understanding Systemic Risk and Governance*, 87 TEMP. L. REV. 229, 268 (2015).

160. Spence, *supra* note 22, at 447.

161. *Id.*

162. See, e.g., Kron, *supra* note 63, at 612–13 (describing the “Halliburton Loophole” in the SWDA and the purported role that Vice President Cheney played in brokering the deal).

163. See, e.g., David Spence, *Energy Management Brief: Is It Time for Federal Regulation of Shale Gas Production?*, ENERGY MGMT. & INNOVATION CTR., <https://www.mcombs.utexas.edu/~media/Files/MSB/Centers/EMIC/Briefs/Energy-Brief-Is-It-Time-for-Federal-Regulation-of-Shale-Gas-Production.pdf> (last visited Sept. 30, 2017).

164. *Id.*

165. Burger, *supra* note 9, at 153 (noting that “most individual contamination events occur entirely within a single state or locality” but arguing that federal regulation is nonetheless preferable).

166. *Id.* at 158–59 (quoting Michael Burger, “It’s Not Easy Being Green” *Local Initiatives, Preemption Problems, and the Market Participant Exception*, 78 U. Cin. L. Rev. 835, 856 (2010)).

167. See, e.g., *id.* at 153.

of fracking across the United States, there is a large risk of interstate pollution.¹⁶⁸ Federal regulation might also be favored in order to address

the interrelated problems of interstate externalities, the “race to the bottom,” and NIMBYism (not in my backyard); the economic efficiencies gained through federal uniformity; the benefits of pooling resources in order to gather technical and scientific expertise; creating durable rules, and providing for enforcement; the potential for greater diversity of interest-group participation; and the mobilization around national moral imperatives.¹⁶⁹

In any event, local governance is rarely a part of this two-sided debate.

II. STATE REGULATIONS

The gap in federal regulations is not unique to that level of governance. Fracking affects every layer of regulation, from local to national, and yet there is no comprehensive regulatory framework at any level.¹⁷⁰ At the state level, categorizing fracking regulations is difficult because of the many steps and processes involved in fracking, and the variety of policies that exist in different states.¹⁷¹ Because fracking is a complex process involving a range of stakeholders, effects, and procedures, most states’ regulations addressing fracking are fragmented across state statutes and codes.¹⁷² Each state has its own regulations and statutory provisions, and no comprehensive database has yet identified individual states’ statutes and regulations that apply to each stage of the process.¹⁷³ Even if an organization were to attempt to catalogue these requirements, state regulations are often being revised as science regarding fracking develops and public opinion shifts.¹⁷⁴

“Currently, only twenty-seven states have laws in place to address hydraulic fracturing and related activities.”¹⁷⁵ These laws employ a broad range of regulatory techniques to manage fracking.¹⁷⁶ For example, the state of New York announced a ban on hydraulic fracturing in December 2014, after a state Department of Health report concluded that more re-

168. *Id.* at 161.

169. *Id.* at 158 (quoting Michael Burger, “It’s Not Easy Being Green” *Local Initiatives, Preemption Problems, and the Market Participant Exception*, 78 U. Cin. L. Rev. 835, 837–38 (2010)).

170. *See* Baker, *supra* note 159, at 268.

171. *See* Hannah J. Wiseman, *Regulatory Islands*, 89 N.Y.U. L. REV. 1661, 1695–97 (2014).

172. *Id.* at 1696–97.

173. *Id.* at 1697. However, Professor Wiseman notes that “some are getting close,” including the Interstate Oil and Gas Compact Commission. *Id.*

174. *Id.* at 1698–99.

175. Blake Lara, *Hydraulic Fracturing: Evaluating Fracking Regulations*, 4 U. BALT. J. LAND & DEV. 177, 181 (2015).

176. *See* Alexandra Dapolito Dunn & Chandos Culleen, *Engines of Environmental Innovation: Reflections on the Role of States in the U.S. Regulatory System*, 32 PACE ENVTL. L. REV. 435, 462–64 (2015).

search into the technology was necessary to determine whether fracking is safe.¹⁷⁷ In 2013, California passed Senate Bill 4, which allowed fracking subject to a number of requirements including permitting, reporting information about fluids used, and providing permit copies to all neighboring property owners and tenants.¹⁷⁸ Some states, such as Maryland, have decided to propose regulations regarding fracking, “but with strict control over the process.”¹⁷⁹ Other states, such as Montana, have allowed fracking with stringent, albeit less comprehensive regulation.¹⁸⁰

Such disparate fracking regulations across states may entice fracking operators to “race to the bottom.”¹⁸¹ Shalanda Helen Baker, for example, believes that this pattern is already occurring: she cites states with more lax regulations, like West Virginia and Pennsylvania, as experiencing the environmental and social effects of fracking in ways that states that have banned fracking, like Vermont and New York, have not.¹⁸²

Recognizing that there is a significant federal gap and a wide variety of regulations across the twenty-seven states that have regulated fracking, we have singled out four states whose approaches to regulating fracking differs significantly. Pennsylvania, North Dakota, Colorado, and Texas all currently allow hydraulic fracturing and have seen large increases in the amount of fracking occurring within their borders over the past ten years. Investigating these states’ policies demonstrates the array of options available for states to regulate land use within their borders. We believe that these four case studies illuminate the wide variety of activity currently occurring in the fracking space. As discussed further in Part V, local governments in these states are also exemplifying a third dimension in the fracking debate: local governance.

A. Colorado

1. Overview

Colorado has an extensive history of oil and gas development. The state’s drilling has historically occurred on the Western Slope of the state, and more recently in the more densely populated Front Range area including Denver and Boulder.¹⁸³ Colorado state law gives primary regulatory authority over oil and gas development to the state, though local

177. *Id.* at 463.

178. *Id.* at 462–63.

179. *Id.* at 463.

180. See NATHAN RICHARDSON ET AL., RES. FOR THE FUTURE, THE STATE OF STATE SHALE GAS REGULATION 15 (2013), <http://www.rff.org/research/publications/state-state-shale-gas-regulation> (comparing the categories and quantity of regulation in different states).

181. Baker, *supra* note 159, at 271.

182. *Id.*

183. CARY WEINER, COLO. STATE UNIV. EXTENSION, FACT SHEET NO. 10.639, OIL AND GAS DEVELOPMENT IN COLORADO (2014), <http://extension.colostate.edu/docs/pubs/consumer/10639.pdf>.

governments also have some explicit authority.¹⁸⁴ Colorado's principal oil and gas law is the 1951 Oil and Gas Conservation Act (COGCA).¹⁸⁵ The COGCA seeks to balance oil and gas development in a manner that is "consistent with protection of public health, safety, and welfare, including protection of the environment and wildlife resources."¹⁸⁶ It grants authority to the Colorado Oil and Gas Conservation Commission (COGCC) to make and enforce regulations as reasonably required to implement such power and authority; otherwise, the statute has very few other specific guidelines for the Commission.¹⁸⁷ However, the COGCC's implementing regulations are specific and cover a large number of subjects. The governor appoints seven of these commissioners and two are executive directors of state agencies.¹⁸⁸ The Commission's "mission is to provide for the responsible development of the oil and gas resources within the state," covering topics like operator registration, permits, notice to the public and landowners, and enforcement.¹⁸⁹ The Commission also runs and maintains an online database cataloging the state's rules.¹⁹⁰

Under the COGCA, local jurisdictions have authority to regulate local affairs, including land use.¹⁹¹ Colorado has a strong tradition of home rule, and as a result, local governments are authorized to address even those aspects of oil and gas development that the Commission's regulations cover, provided that "the local government regulations can be harmonized with state regulations and do not 'materially impede' or 'destroy' the state regulation."¹⁹² Thus, the state's interest in uniform policies across its jurisdiction and local governments' interest in flexibility and autonomy are sometimes at odds.¹⁹³ Colorado's state courts have held that state laws will only preempt local efforts if the local law causes an operational conflict with state law.¹⁹⁴ Further, two Colorado Supreme Court cases have held that local governments can regulate oil and gas operations, but "cannot completely prohibit state-sanctioned oil and gas development within their jurisdictions."¹⁹⁵

184. *Id.*

185. John Jennings, *Current Topics in Colorado's Regulatory Landscape*, 92 DENV. U. L. REV. ONLINE 183, 185–86 (2015).

186. COLO. REV. STAT. § 34-60-102(1)(a)(I) (2017).

187. *See id.* § 34-60-105(1).

188. Jennings, *supra* note 185, at 186 (citing COLO. REV. STAT. § 34-60-104 (2014)).

189. *Id.* (quotation omitted).

190. *Id.*

191. *See id.*

192. Joel Minor, *Local Government Fracking Regulations: A Colorado Case Study*, 33 STAN. ENVTL. L.J. 61, 104–05 (2014) (quoting Bd. of Cty. Comm'rs v. Bowen/Edwards Assocs., 830 P.2d 1045, 1059 (Colo. 1992)).

193. *See* Jennings, *supra* note 185, at 186–87.

194. *See id.*

195. *Id.*; *see also* Voss v. Lundvall Bros., 830 P.2d 1061, 1062 (Colo. 1992); Bd. of Cty. Comm'rs v. Bowen/Edwards Assocs., 830 P.2d 1045, 1055–56 (Colo. 1992).

Litigation has erupted in Colorado as a result of localities enacting bans or other restrictions on fracking.¹⁹⁶ In May 2016, the Colorado Supreme Court struck down local government fracking bans, affirming a lower court's ruling that state law preempted a local fracking prohibition.¹⁹⁷ In addition to litigation, both industry-backed and industry-opposed groups proposed ballot initiatives to amend the state constitution in 2014.¹⁹⁸ Further, as the result of a politically-engineered compromise, the groups backing all four ballot measures withdrew their petitions before the general election in 2014.¹⁹⁹

2. Permitting & Reporting Requirements

Permitting and reporting requirements in Colorado are regulated by the 1965 Ground Water Management Act, which requires "every well intending to divert tributary, nontributary, designated, or Denver Basin groundwater first secure a permit."²⁰⁰ These subcategories each require slightly different permit processes.²⁰¹ For example, in areas of Colorado facing water shortages, additional water saving action (an "augmentation plan") is required.²⁰² These permits are usually distributed by the state engineer and may differ slightly depending on the type of groundwater to be removed.²⁰³

In 2011, the Colorado Legislature passed a law requiring "operators to keep a chemical inventory on-site at each well and make that information available to emergency responders and local governments within [twenty-four] hours in the event of a spill."²⁰⁴ The law also requires that operators report the amount and type of chemical added to their fracturing mixtures.²⁰⁵ Drilling operators are encouraged, but not required, to create a Comprehensive Drilling Plan intended to identify foreseeable oil and gas activities in a defined geographic area.²⁰⁶ All operators must file

196. Jennings, *supra* note 185, at 186.

197. Michael Wines, *Colorado Court Strikes Down Local Bans on Fracking*, N.Y. TIMES (May 2, 2016), <https://www.nytimes.com/2016/05/03/us/colorado-court-strikes-down-local-bans-on-fracking.html>.

198. *Ballot Measures Withdrawn*, *supra* note 2.

199. *Id.*

200. Yong Eoh, *Yes, No, Maybe So: Uncertainty in Texas Groundwater Withdrawal for Hydraulic Fracturing*, 52 HOUS. L. REV. 1227, 1244 (2015) (citing COLO. REV. STAT. §§ 37-90-107, -137 (2013)).

201. *Id.* at 1245.

202. *Id.* at 1244-45.

203. *Id.* at 1245.

204. Francis Gradijan, *State Regulations, Litigation, and Hydraulic Fracturing*, 7 ENVTL. & ENERGY L. & POL'Y J. 47, 68 (2012) (quoting David O. Williams, *Critics Claim Colorado Gas Drillers Playing Both Sides of 'Fracking' Debate*, COLO. INDEP. (July 22, 2010), <http://www.coloradoindependent.com/57895/critics-claim-colorado-gas-drillers-playing-both-sides-of-fracking-debate>).

205. *Id.* at 68-69.

206. See 2 COLO. CODE REGS. § 404-1:216(a) (2017).

detailed and truthful reports at times specified by the state regulations and conduct tests to determine the presence of waste or pollution.²⁰⁷

Other aspects of hydraulic fracturing governed by the COGCC health and safety requirements (600 Series) include fire prevention and setback and mitigation requirements for various types of buildings.²⁰⁸ The 1200 Series establishes a comprehensive wildlife protection system.²⁰⁹

3. Casing & Cementing Standards

Colorado's "300 Series" of regulations regulates drilling, development, production, and abandonment of wells.²¹⁰ Rule 326 governs the mechanical integrity of wells. It specifies that there shall be a "test to determine if there is a significant leak in the well's casing, tubing, or mechanical isolation device."²¹¹ The Commission's regulations also cover well spacing requirements.²¹²

4. Air

Regulation 805 specifies that oil and gas facilities "shall be operated in such a manner that odors and dust do not constitute a nuisance or hazard to public welfare."²¹³ Operators must control fugitive dust caused by their operations.²¹⁴ The regulation controls emissions from production equipment, such as crude oil, and from well completions.²¹⁵

5. Water: Surface, Ground, and Wastewater

Colorado regulates groundwater, but no other type of water contamination: in 2012, the COGCC promulgated a final rule that will apply to oil and gas wells permitted on or after May 1, 2013.²¹⁶ That rule requires initial baseline samples of groundwater underlying the wells and subsequent monitoring from several locations on a proposed oil and gas well.²¹⁷

Well construction for oil and gas purposes is generally not allowed in any of the designated basins, and the operator must formally apply to change the water right.²¹⁸ For operators entering into agreements with

207. *Id.* § 404-1:206.

208. *See id.* §§ 404-1:604, .606A, .609.

209. *Id.* §§ 404-1:1201 to :1205 (requiring operators to identify impacted wildlife and creating area-specific restrictions).

210. *Id.* §§ 404-1:300 to :341.

211. *Id.* § 404-1:326.

212. Minor, *supra* note 192, at 103.

213. 2 COLO. CODE REGS. § 404-1:805(a).

214. *Id.* § 404-1:805(c).

215. *Id.* § 404-1:805(b).

216. *Id.* § 404-1:609.

217. *Id.* § 404-1:609(b).

218. Eoh, *supra* note 200, at 1246.

landowners to divert non-tributary groundwater from the aquifer underlying the landowner's land, no more than one percent of the amount of groundwater estimated to be in the aquifer may be withdrawn annually.²¹⁹

Operators seeking to withdraw groundwater outside of designated groundwater basins must usually secure a court-approved augmentation plan.²²⁰ According to Yong Eoh, "[t]his is because most wells exist in parts where surface streams are over-appropriated, and because these wells usually have junior water rights."²²¹

6. Recent Updates

A 2011 study by STRONGER,²²² an independent nonprofit that helps states develop hydraulic fracturing regulations, suggested several improvements to Colorado's regulatory framework.²²³ First, the group proposed that the COGCC set minimum and maximum surface casing depths to demonstrate that those depths protect fresh groundwater.²²⁴ Second, STRONGER recommended that the state COGCC and Colorado's Division of Water Resources "jointly evaluate available sources of water for use in hydraulic fracturing."²²⁵

In 2014, Colorado approved regulations crafted by the state's most productive oil and gas producers in conjunction with the Environmental Defense Fund.²²⁶ The regulations seek to "fix persistent leaks from tanks and pipes" by "require[ing] companies to install equipment to minimize leakage of toxic gases and to control or capture 95 percent of emissions."²²⁷ They also represent any state's first attempt to regulate methane emissions caused by fracking.²²⁸

In February 2015, a task force of twenty-one governor-appointed members²²⁹ unanimously recommended a series of action items "to har-

219. *Id.*

220. *Id.* at 1244-45.

221. *Id.* at 1246.

222. See generally STRONGER, STATE REVIEW OF OIL AND NATURAL GAS ENVIRONMENTAL REGULATIONS (2016), <http://www.strongerinc.org/wp-content/uploads/2016/09/STRONGER-Presentation.pdf> (last visited Sept. 30, 2017) (explaining the structure and purpose of the organization).

223. STRONGER, COLORADO HYDRAULIC FRACTURING STATE REVIEW 5-7 (2011), http://cewc.colostate.edu/wp-content/uploads/2012/02/Colorado_HF_Review_2011.pdf.

224. *Id.* at 5-6.

225. *Id.* at 7.

226. Jennifer Oldham, *Colorado First State to Clamp Down on Fracking Methane Pollution*, BLOOMBERG (Feb. 23, 2014, 7:20 PM), www.bloomberg.com/news/articles/2014-02-24/colorado-first-state-to-clamp-down-on-fracking-methane-pollution.

227. *Id.*

228. *Id.*

229. These members included six representatives from the oil and gas industry, agricultural industry, or homebuilding industry; six members from local government and conservation communities; and seven members from a variety of other interests. KEYSTONE CTR., COLORADO OIL AND GAS

monize state and local regulatory structures” respecting the oil and gas industry.²³⁰ One such recommendation advised each municipality to create a Local Government Designee to work with the COGCC in an effort to improve communication between the localities and state government, and mitigate community-specific impacts.²³¹ This report also recommended that the Oil and Gas Commission focus on drafting rules that would enhance local governments’ involvement in the drill permitting process.²³²

B. North Dakota

1. Overview

In the last ten years, North Dakota has emerged as the third-largest oil producing state in the United States.²³³ Fracking in North Dakota is governed by the oil and gas regulations in the North Dakota Century and Administrative Codes (NDAC) and enforced by the North Dakota Industrial Commission’s Department of Mineral Resources.²³⁴ These regulations cover several aspects of the hydraulic fracturing process, including permitting requirements and rules regarding the disposition of fracturing fluids, disclosure, and record keeping.²³⁵

The North Dakota Department of Health Environmental Health Section administers provisions of the NDAC that protect the state’s air, land, and water resources. The North Dakota Department of Trust Lands regulates oil and gas lease agreements, bonus payments and royalties, rights-of-way applications and procedures, surface damage agreements, and seismic surveys.²³⁶

2. Permitting & Reporting Requirements

In North Dakota, no entity or person may begin any operations for drilling a well without first obtaining a permit from the North Dakota Industrial Commission.²³⁷ Moreover, unless the Commission provides a waiver, it will not issue a permit for an oil or gas well to be located within 500 feet of a permanently occupied dwelling.²³⁸ If the Commission

TASK FORCE FINAL REPORT 4 (2015), <http://www.cred.org/wp-content/uploads/2015/04/OilGasTaskForceFinalReport.pdf>.

230. *Id.* at 3.

231. *Id.* at 9–11.

232. *Id.* at 5–8.

233. *Shale and Fracking Tracker: North Dakota*, VINSON & ELKINS, <http://www.velaw.com/Shale---Fracking-Tracker/US-State-Resources/North-Dakota> (last visited Sept. 30, 2017).

234. *Id.*

235. *Id.*

236. *Id.*

237. N.D. CENT. CODE § 38-08-05(1) (2017).

238. *Id.* § 38-08-05(2).

issues a permit within 1,000 feet of an occupied dwelling, it reserves the right to impose additional conditions on the permit operator.²³⁹

Within thirty days of ceasing operations, any open pit must be reclaimed.²⁴⁰ North Dakota law requires that within sixty days of performing hydraulic fracturing, the owner, operator, or service company must “post on the [F]rac[F]ocus chemical disclosure registry all elements made viewable by the [F]rac[F]ocus website.”²⁴¹ However, there are no express exceptions to reporting requirements for trade secrets or otherwise confidential information.²⁴²

3. Casing & Cementing Standards

North Dakota regulations specify that all wells drilled for oil or natural gas must be “properly cemented at sufficient depths to adequately protect and isolate all formations containing water, oil or gas or any combination of these; protect the pipe . . . and isolate the uppermost sand of the Dakota group.”²⁴³ These regulations require operators to pressure test casing strings after cementing and before beginning other operations, like injecting fracking fluid, in the well.²⁴⁴ In addition, operators are required to keep a log describing the presence and quality of bonding of cement before completing any well and must file these reports within thirty days of completing the work.²⁴⁵ Further, North Dakota requires the application of an appropriate cement evaluation tool to test well bore and casing integrity before conducting hydraulic fracturing activity.²⁴⁶

Any exploration and production waste must be disposed of in a particular manner. This means that such waste must be stored in lined pits removed within seventy-two hours after operations have ceased, and disposed of at an authorized facility.²⁴⁷ Lastly, the North Dakota Industrial Commission may grant exceptions to these rules, “after due notice and hearing, when such exceptions will result in the prevention of waste and operate in a manner to protect correlative rights.”²⁴⁸

4. Air

North Dakota regulations do not establish any particular requirements for air pollution or emissions, but they do specify that “[t]he commission may require surface air monitoring [] to detect movement of [sequestered] carbon dioxide that could endanger an underground source

239. *Id.*

240. N.D. ADMIN. CODE § 43-02-03-19.3 (2017).

241. *Id.* § 43-02-03-27.1.

242. *See id.*

243. *Id.* § 43-02-03-21.

244. *Id.*

245. *Id.* § 43-02-03-21 to -25.

246. *Id.* § 43-02-03-27.1.

247. *Id.* § 43-02-03-19.3.

248. *Id.* § 43-02-03-02.

of drinking water.”²⁴⁹ Sequestered carbon dioxide might leak into underground drinking water if, for example, it escapes “the drilled holes [] of improperly constructed injection wells.”²⁵⁰ Carbon dioxide might also leach into the drinking water supply if plugged wells are not adequately sealed, if there are faults or fractures in the surrounding rock formations, or from “[l]ateral and upward movement into hydraulically connected USDWs [underground sources of drinking water].”²⁵¹ Should carbon dioxide build up in any of these confined spaces, it could increase the pressure on the water source, potentially causing seismic events.²⁵²

5. Water: Surface, Ground, and Wastewater

Much of North Dakota’s fracking regulation regarding water relates to carbon dioxide sequestration.²⁵³ Before issuing a permit, the Oil and Gas Commission must find that the drilling operation’s storage facility for carbon dioxide will not adversely affect surface waters or any freshwater source.²⁵⁴ North Dakota regulations specify that drilling pits “shall be diked to prevent surface water from running into the pit,”²⁵⁵ and treatment facilities “shall be constructed and operated so as not to endanger surface or subsurface water supplies.”²⁵⁶

For groundwater, all applications for permits to drill must provide leak detection and monitoring plans for all wells and surface facilities, and this plan must “[i]dentify potential degradation of groundwater resources, with a particular emphasis on underground sources of drinking water.”²⁵⁷ Further, the operator must prepare a testing and monitoring plan to ensure that any sequestration project does not endanger underground sources of drinking water.²⁵⁸ This plan must include “periodic monitoring of ground water quality and geochemical changes.”²⁵⁹

North Dakota has no additional requirements for wastewater disposal.²⁶⁰

6. Recent Updates

North Dakota has recently challenged the BLM’s proposed rules for fracking on BLM-managed land, arguing that federal law lets states regu-

249. *Id.* § 43-05-01-11.4(1)(h).

250. *Carbon Dioxide Capture and Sequestration: Storage Safety and Security*, EPA, https://19january2017snapshot.epa.gov/climatechange/carbon-dioxide-capture-and-sequestration-storage-safety-and-security_.html (last updated Sept. 29, 2016).

251. *Id.*

252. *Id.*

253. *See* N.D. CENT. CODE §§ 38-22-08 to -23 (2017).

254. *Id.* § 38-22-08(7).

255. N.D. ADMIN. CODE § 43-02-03-19.4 (2017).

256. *Id.* § 43-02-03-51.3(13).

257. *Id.* § 43-05-01-05(1)(g)(2).

258. *Id.* § 43-05-01-11.4.

259. *Id.* § 43-05-01-11.4(1)(d).

260. *See* N.D. CENT. CODE §§ 38-01-01 to 38-22-23 (2017).

late oil and gas operations, and thus these regulations impermissibly override North Dakota's authority.²⁶¹ Several other states, including Colorado, Wyoming, and Utah, have joined the suit. As described above in Part II, Judge Skavdahl in Wyoming issued an injunction in September 2015 halting the implementation of these regulations.²⁶²

C. Pennsylvania

1. Overview

Fracking has been used as a method of gas extraction in Pennsylvania since the 1950s, but the practice has grown exponentially since the late 2000s.²⁶³ In response to this increased practice, Pennsylvania significantly updated its Oil and Gas Act in 2012 and in 2016.²⁶⁴ This Act explicitly preempts local control over fracking.²⁶⁵ The Coal and Gas Resource Coordination Act, the Oil and Gas Conservation Law, and the state's environmental protection laws also regulate fracking.²⁶⁶ Other environmental protection laws include the "Clean Streams Law, the Dam Safety and Encroachments Act, the Solid Waste Management Act, the Water Resources Planning Act[,] and the Community Right to Know Act."²⁶⁷

The Pennsylvania Department of Environmental Protection (DEP) enacts and enforces fracking regulations in Pennsylvania. David Spence argues that, consistent with his theory of "mission-orientation,"²⁶⁸ the delegation of fracking regulation to the DEP demonstrates a commitment

261. Katherine Lynn, *North Dakota Seeks to Join Suit Against Federal Fracking Rule*, GRAND FORKS HERALD (Mar. 31, 2015, 2:21 PM), <http://www.grandforksherald.com/news/business/3711856-north-dakota-seeks-join-suit-against-federal-fracking-rule>.

262. Coral Davenport, *Judge Blocks Obama Administration Rules on Fracking*, N.Y. TIMES (Sept. 30, 2015), <https://www.nytimes.com/2015/10/01/us/politics/judge-blocks-obama-administration-rules-on-fracking.html>.

263. See PA. DEP'T OF ENVTL. PROT., PENNSYLVANIA HYDRAULIC FRACTURING STATE REVIEW 10 (2010), <http://www.strongerinc.org/wp-content/uploads/2015/04/PA-HF-Review-Print-Version.pdf>.

264. See PA. DEP'T OF ENVTL. PROT., FINAL REGULATIONS FOR OIL AND GAS SURFACE ACTIVITIES 1–2, <http://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortal-Files/Environmental%20Quality%20Board/2016/February%203/Fact%20Sheet%20for%20Final%20Ch%2078%20Regulation.pdf> (last visited Sept. 30, 2017); Marie Cusick, *DEP Finalizes New Oil and Gas Drilling*, STATEIMPACT (Jan. 6, 2016, 3:10 PM), <https://stateimpact.npr.org/pennsylvania/2016/01/06/dep-finalizes-new-oil-and-gas-drilling-regulations>.

265. See *Huntley & Huntley, Inc. v. Borough Council*, 964 A.2d 855, 858 (Pa. 2009).

266. *Laws, Regulations and Guidelines*, PA. DEP'T OF ENVTL. PROT., <http://www.dep.pa.gov/Business/Energy/OilandGasPrograms/OilandGasMgmt/Pages/Laws,-Regulations-and-Guidelines.aspx> (last visited Aug. 31, 2017).

267. *Id.*

268. This theory suspects that people attracted to work for an agency will exhibit policy preferences consistent with its statutory mission. Spence, *supra* note 22, at 458.

to minimizing the environmental impacts of fracking.²⁶⁹ DEP has more than doubled its drilling oversight staff since 2008.²⁷⁰ Spence's hypothesis may well be reflected by this increase in attention to drilling. However, some commentators argue that Pennsylvania regulators are still understaffed.²⁷¹

2. Permitting & Reporting Requirements

Drilling a well in Pennsylvania requires a license.²⁷² Revenue from drill permit application fees funds the DEP staff as well as the DEP oil and gas program more broadly.²⁷³ Pennsylvania is "not involved in regulating lease agreements between mineral property owners and producers . . . DEP does not audit payments, read or calibrate meters, or tanks, or otherwise involve itself in disputes over lease issues."²⁷⁴ Instead, authority over leasing state land for fracking operations lies with the Commonwealth's Department of Conservation and Natural Resources.²⁷⁵ For non-state lands, there is no agency oversight of the private contracts between landowners and lease-seekers.²⁷⁶

The Pennsylvania Oil and Gas Act requires operators to notify the DEP at least twenty-four hours before they begin drilling a well, but there is no specific requirement that the operator notify the DEP before beginning the fracking process by injecting fluid into the pre-drilled well.²⁷⁷ The operator must then file a report within thirty days after completing drilling, and that report must include information about the well, such as the type of propping agent that will be used, average injection

269. *Id.*

270. Sabrina Shankman, *New Gas Drilling Rules, More Staff for Pennsylvania's Environmental Agency*, PROPUBLICA (Feb. 9, 2010, 12:44 PM), <https://www.propublica.org/article/new-gas-drilling-rules-more-staff-for-pennsylvanias-environmental-agency>.

271. Katie Colaneri, *Well Inspectors Lured by Higher Pay to Industry Jobs*, STATEIMPACT (Oct. 7, 2013, 1:47 PM), <https://stateimpact.npr.org/pennsylvania/2013/10/07/well-inspectors-lured-by-higher-pay-to-industry-jobs>.

272. Eoh, *supra* note 200, at 1240. This requirement exempts farmers, drilling for "farming purposes," as well as landowners drilling on their own property, or lessees drilling on leased property. 32 PA. CONS. STAT. § 645.4 (2017).

273. Laura Legere, *Drilling Decline in Pennsylvania Hurts Funding for DEP Regulators*, PITTSBURGH POST-GAZETTE: POWERSOURCE (May 19, 2015, 12:00 AM), <http://powersource.post-gazette.com/powersource/policy-powersource/2015/05/19/Oil-and-gas-drilling-decline-hurts-funding-for-Pennsylvania-DEP-regulators>.

274. *Laws, Regulations and Guidelines*, *supra* note 266.

275. See Laura Legere, *Pennsylvania Legislature Wins in Court on Fracking Royalties*, PITTSBURGH POST-GAZETTE: POWERSOURCE (Jan. 7, 2015, 1:05 PM), <http://powersource.post-gazette.com/powersource/policy-powersource/2015/01/07/Court-Pennsylvania-DCNR-not-governor-has-authority-to-OK-natural-gas-leases-on-state-lands>; see also PA. DEP'T OF CONSERVATION AND NAT. RES., M-O&G (11-09), OIL AND GAS LEASE FOR FOREST STATE LANDS 1, http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_008504.pdf (last visited Aug. 31, 2017).

276. See *Pennsylvania – Leasing Tips for Natural Gas Drilling*, THE NETWORK FOR PUB. HEALTH LAW https://www.networkforphl.org/_asset/6djmnl/Pennsylvania-Leasing-Tips-FINAL.pdf (last visited Aug. 31, 2017).

277. PA. DEP'T OF ENVTL. PROT., *supra* note 263, at 18.

rate, rock pressure, and well service company name.²⁷⁸ Pennsylvania's chemical disclosure rules require that drilling companies disclose to the DEP the names of chemicals (excluding trade secrets) that are used at a drilling site within six days of the conclusion of fracking.²⁷⁹ Recently-enacted regulatory changes require prospective drillers to identify public resources like schools and playgrounds that would be affected by drilling.²⁸⁰

3. Casing & Cementing Standards

Pennsylvania's standards for casing and cementing are expressed as performance standards—for example, casing must be “of sufficient cemented length and strength to attach proper well control equipment and prevent blowouts, explosions, fires and casing failures.”²⁸¹ Such casing standards were updated in 2011.²⁸² “General provisions for well construction and operation require the operator to ‘construct and operate the well’ in a manner that will ensure the integrity of the well [and protect] ‘health, safety, environment, and property.’”²⁸³ These plans must describe the casing that the operation is using, the proposed depths to which they will set casing, the proposed placement of centralizers, and detailed information about the type of cement they will use.²⁸⁴

4. Water: Surface, Ground, and Wastewater

Pennsylvania manages fracking wastewater in four ways: it is “(1) [r]eused to fracture additional wells; (2) [t]reated and discharged to surface water; (3) [i]njected into underground disposal wells; or (4) [t]ransported to out-of-state facilities.”²⁸⁵

For groundwater, the 2012 Oil and Gas Act dictates that water withdrawals used for oil and gas drilling may not adversely affect the quality or quantity of water in the watershed.²⁸⁶ This Act requires operators to restore or replace a water supply with an alternative source of water of similar quantity and quality.²⁸⁷ Additionally, both the DEP and

278. *Id.*

279. 58 PA. CONS. STAT. § 3222.1(b), (d) (2016); Gradijan, *supra* note 204, at 74–75; Spence, *supra* note 22, at 456.

280. Cusick, *supra* note 264.

281. Spence, *supra* note 22, at 455 (quoting 25 PA. CODE § 78.71(a) (2011)).

282. Timothy James Furdyna, *Strengthening State Regulation of Casing and Cementing in High Volume Hydraulically Fractured Natural Gas Wells*, 9 APPALACHIAN NAT. RESOURCES L.J. 1, 24 (2015).

283. *Id.* at 25 (quoting 25 PA. CODE § 78.73(a) (2015)).

284. See PA. DEP'T OF ENVTL. PROT., *supra* note 263, at 11; see also Furdyna, *supra* note 282, at 25–26.

285. PA. DEP'T OF ENVTL. PROT., *supra* note 263, at 10. The Pennsylvania DEP is not authorized to administer its own UIC program due to the EPA's federal primacy. *Id.* at 11.

286. STRONGER, PENNSYLVANIA FOLLOW-UP STATE REVIEW 60 (2013), <http://www.strongerinc.org/wp-content/uploads/2015/04/Final-Report-of-Pennsylvania-State-Review-Approved-for-Publication.pdf>.

287. Eoh, *supra* note 200, at 1240.

the Oil and Gas Act require operators to submit water management plans to identify where and how much water will be withdrawn during fracking operations.²⁸⁸ Where water contamination occurs, there is a legal presumption that the oil and gas well operator is responsible for the pollution if the contamination “occurs within six months of drilling and is within 1,000 feet of the well.”²⁸⁹

There are few other specific requirements for protecting surface or wastewater.²⁹⁰ Both the landowner and operator must undertake baseline water quality tests before operation.²⁹¹ However, some regions facing water scarcity must develop water plans that identify existing and future uses of water available in these areas.²⁹²

5. Air

The General Permit for Air Pollution Control in Natural Gas Compression and/or Processing Facilities (GP-5) regulates air emissions in Pennsylvania.²⁹³ This general permit authorizes the construction, modification, and operation of natural gas or gas processing facilities.²⁹⁴ It is only applicable to non-major facilities (as defined by the CAA);²⁹⁵ major facilities need separate plan approval from the DEP before construction.²⁹⁶

6. Recent Updates

The nonprofit STRONGER recommended in 2013 that the DEP improve its data standardization for tracking violations and enforcement actions to facilitate accurate internal performance and transparency to the public.²⁹⁷ The team also recommended that the DEP complete a study for unconventional gas development to determine whether its program appropriately assesses wastes to detect radiation.²⁹⁸ Further, the organization recommended that DEP consider developing a process by which it determines surface casing depths to protect fresh groundwater, as its

288. *Id.*

289. PA. DEP'T OF ENVTL. PROT., *supra* note 263, at 5.

290. *See id.* at 38.

291. *See id.* at 5.

292. Eoh, *supra* note 200, at 1240.

293. STRONGER, *supra* note 286, at 113; *see also* GP-05, *Natural Gas Compression Facilities*, PA. DEP'T ENVTL. PROTECTION ELIBRARY, <http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-9747> (last visited Sept. 2, 2017).

294. STRONGER, *supra* note 286, at 113.

295. 35 PA. CONS. STAT. § 4006.6(b) (2016). “Major” is as defined in Title V of the CAA: “[A]ny source that emits or has the potential to emit 100 tons per year or more of any criteria air pollutant.” 42 U.S.C. § 7602(j) (2012).

296. BUREAU OF AIR QUALITY, PA. DEP'T OF ENVTL. PROT., COMMENT/RESPONSE DOCUMENT FOR MODIFICATIONS TO THE GENERAL PLAN APPROVAL AND/OR GENERAL OPERATING PERMIT FOR NATURAL GAS COMPRESSION AND/OR PROCESSING FACILITIES (BAQ-GPA/GP-5) 4 (2015), <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-105849/2700-PM-BAQ0205%20GP-5%20Comment%20and%20%20Response%20Document%201-13-2015.pdf>.

297. STRONGER, *supra* note 286, at 11.

298. *Id.* at 11–12.

methodology has been inconsistent thus far.²⁹⁹ STRONGER also suggested the state consider developing guidance for pre-drilling water sampling.³⁰⁰ DEP's annual reports suggest that Pennsylvania has considered some, but not all, of STRONGER's suggestions.³⁰¹

Recent legislative activity suggests that fracking will continue in Pennsylvania under regulation in the near future. Disagreeing with New York State's fracking ban in December 2014, Pennsylvania Governor Tom Wolf said he believes fracking can be done safely: "I want to do what I think we can do here in Pennsylvania and that is have this industry, but do it right from an environmental point of view, from a health point of view."³⁰² However, Governor Wolf also stated that he would support a moratorium on fracking in the Delaware River basin in the eastern part of the state and on new leasing in state parks and forests.³⁰³ On January 29, 2015, he signed a moratorium on drilling in Pennsylvania's state parks and national forests, comprising over two million acres of land.³⁰⁴

Later, in April 2015, Governor Wolf heard comments from the public on proposed fracking regulations that would increase the mandatory setbacks of oil and gas drilling operations to at least one mile from schools.³⁰⁵ "The new rules would also ban temporary fracking waste storage pits at well sites and increase requirements for ponds used as way stations for drilling waste."³⁰⁶ These rules were finalized in October 2016, and "require additional measures if fracking is taking place near public resources, and requires drillers to restore water supply that is degraded or damaged through fracking."³⁰⁷

299. *Id.* at 12.

300. *Id.* at 12–13.

301. See generally OFFICE OF OIL & GAS MGMT., PA. DEP'T OF ENVTL. PROT., 2016 OIL AND GAS ANNUAL REPORT (2016), <http://www.depgis.state.pa.us/oilgasannualreport/index.html> (demonstrating none of the 2013 STRONGER recommendations had been adopted in 2016); OFFICE OF OIL & GAS MGMT., PA. DEP'T OF ENVTL. PROT., 2015 OIL AND GAS ANNUAL REPORT 22-23, 25-26 (2015), <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-113887/8000-RE-DEP4621> (describing plans to study casing requirements and efforts to evaluate radiation levels in 2015); OFFICE OF OIL & GAS MGMT., PA. DEP'T OF ENVTL. PROT., 2014 OIL AND GAS ANNUAL REPORT (2014), http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-113130/2014_Annual_Report_for_web_July1.pdf (describing future plans to study casing requirements in 2014).

302. Katie Colaneri, *Wolf: New York's Fracking Ban is "Unfortunate,"* STATEIMPACT (Dec. 18, 2014, 5:09 PM), <http://stateimpact.npr.org/pennsylvania/2014/12/18/wolf-new-yorks-fracking-ban-is-unfortunate>.

303. *Id.*

304. Jon Delano, *Gov. Wolf Signs Moratorium on Fracking on State Lands*, CBS PITTSBURGH (Jan. 29, 2015, 12:07 PM), <http://pittsburgh.cbslocal.com/2015/01/29/wolf-bans-new-gas-drilling-leases-on-public-land-as-promised>.

305. Reid R. Frazier, *State Hears Comments on New Fracking Regulations*, ALLEGHENY FRONT (Apr. 29, 2015), <http://www.allegHENYfront.org/story/state-hears-comments-new-fracking-regulations>.

306. *Id.*

307. David DeKok, *Pennsylvania Adopts New Fracking Regulations*, REUTERS (Oct. 7, 2016, 2:15 PM), <http://www.reuters.com/article/us-usa-pennsylvania-fracking-idUSKCN1272B3>.

In all, Pennsylvania has a fairly comprehensive set of fracking regulations covering the major categories of environmental risks. Under the leadership of Governor Wolf, the state appears to be taking a more protective approach to fracking that reflects some of the concerns that states like New York have recognized. However, as averred by STRONGER, there are some key areas in which Pennsylvania might strengthen its regulations, particularly with respect to pre-drilling water sampling and establishing a methodology to determine surface casing depths.

D. Texas

1. Overview

Texas's approach to fracking is highly decentralized; local jurisdictions have significant leeway in defining how oil and gas development occurs in the state.³⁰⁸ The Texas Railroad Commission administers the bulk of statewide regulatory authority, but the Texas Commission on Environmental Quality is responsible for administering air quality regulations, "waste disposal[,] and other pollution-related aspects of gas production."³⁰⁹ However, Texas has cut the Commission on Environmental Quality's budget by about a third since 2008, implicating the organization's ability to effectively enforce air pollution.³¹⁰

Spence believes that in delegating power to the Railroad Commission, Texas has demonstrated its emphasis on natural gas development without a corresponding emphasis on environmental values.³¹¹ In further support of this argument, a 2012 University of Texas poll showed that Texans are more likely to support fracking and believe it requires less regulation compared to Pennsylvanians or New Yorkers.³¹²

2. Permitting & Reporting Requirements

For oil and gas drilling, the Railroad Commission of Texas requires permits for the following: new wellbores; working over an existing wellbore to complete in a different reservoir; reentry of a plugged well; re-

308. See Ryan Hackney, Note, *Don't Mess with Houston, Texas: The Clean Air Act and State/Local Preemption*, 88 TEX. L. REV. 639, 658 (2010) (noting that cities in Texas have a "great deal of discretion in managing their affairs, and their ordinances will only be deemed invalid where the legislature has limited their authority with unmistakable clarity.").

309. Spence, *supra* note 22, at 458. See also Hackney, *supra* note 308, at 639, 649–50 (explaining that the Texas Commission on Environment Quality administers an air quality regulatory program).

310. Lisa Song et al., *Fracking Boom Spews Toxic Air Emissions on Texas Residents*, INSIDE CLIMATE NEWS (Feb. 18, 2014), <http://insideclimatenews.org/news/20140218/fracking-boom-spews-toxic-air-emissions-texas-residents>.

311. Spence, *supra* note 22, at 458.

312. *Id.* at 459.

classification of a well from injection/disposal to an oil/gas producing well; and transferring of the well location.³¹³

Regarding water wells specifically, Texas groundwater conservation districts “have broad authority under the Texas Water Code to determine how and when a permit will be required” to be utilized in the district.³¹⁴ However, groundwater conservation districts are required to develop a permit program for “drilling, equipping, operating, or completing . . . wells[,]” except for wells that are statutorily exempt.³¹⁵ Drilling a well solely to support a rig actively engaged in oil and gas exploration is exempted from this permitting requirement.³¹⁶ Thus, many groundwater conservation districts have failed to issue permits for wells drilled for fracking. Nevertheless, some districts have conversely construed this exemption as inapplicable to water wells used for fracking.³¹⁷ These districts have argued that the exemption does not apply because the statute only exempts “drilling,” not “drilling and operating,” as Texas’s statute regulating well drilling for livestock use does.³¹⁸

In 2012, the Railroad Commission of Texas implemented the Hydraulic Fracturing Disclosure Rule.³¹⁹ This rule requires Texas oil and gas operators to disclose the chemical ingredients and water volumes used in hydraulic fracturing treatments on the website FracFocus.³²⁰ However, this rule does not apply to components considered “trade secrets,” to chemicals that are not disclosed to the operators themselves by manufacturers, or chemicals present in trace amounts.³²¹

3. Casing & Cementing Standards

Compared to Pennsylvania’s emphasis on performance standards, Texas’s substantive regulations focus on the attainment of specific technical goals.³²² Administrative Code Rule § 3.13 provides specification for well casing, cementing, drilling, well control, and completion requirements.³²³ The Railroad Commission regulations include well construction requirements and surface gauges used to measure contamination and protect groundwater.³²⁴ “Operators . . . must comply with gen-

313. INFO. TECH. SERVS. DIV., R.R. COMM’N OF TEX., DRILLING PERMITS (W-1) ONLINE FILING USER’S GUIDE 9, 54–57 (2017), <http://www.rrc.state.tx.us/media/20067/dpmanual.pdf>.

314. Trey Nesloney, *Fracking Dry: Issues in Obtaining Water for Hydraulic Fracturing Operations in Texas*, 45 TEX. ENVTL. L.J. 197, 207–08 (2015).

315. *Id.* at 208 (quoting TEX. WATER CODE ANN. § 36.113(a) (West 2017)).

316. *Id.*

317. *Id.*

318. *Id.* at 209 (quoting TEX. WATER CODE ANN. § 36.117(b) (West 2017)).

319. 16 TEX. ADMIN. CODE § 3.29 (2017).

320. *Hydraulic Fracturing*, R.R. COMM’N OF TEX., <http://www.rrc.state.tx.us/about-us/resource-center/faqs/oil-gas-faqs/faq-hydraulic-fracturing> (last visited Sept. 16, 2017).

321. Gradijan, *supra* note 204, at 79.

322. See Spence, *supra* note 22, at 458.

323. ADMIN. § 3.13.

324. R.R. COMM’N OF TEX., *supra* note 320 (follow “HOW DOES THE COMMISSION PROTECT GROUND WATER?” hyperlink).

eral proper wellhead practices for casing and well-waste disposal.”³²⁵ However, these rules apply only to wells that will be “spudded” on or after January 1, 2014.³²⁶

4. Air

Although the Texas Commission on Environmental Quality regulates air quality, there are no regulations specifically related to air quality and fracking in Texas. A 2014 study revealed that there were “[o]nly five permanent air monitors . . . in [a] 20,000-square-mile region,” and that the monitors were all located “far from the . . . drilling areas where emissions are highest.”³²⁷ Further, the Texas Commission on Environmental Quality investigates only a small percentage of emissions complaints filed.³²⁸

5. Water: Surface, Ground, and Wastewater

Water use in Texas is regulated by the Texas Commission on Environmental Quality, which regulates the use of surface water, and local groundwater conservation districts, with authority over the use of groundwater in their regions.³²⁹

To protect groundwater, the Railroad Commission states that all wells drilled in Texas must have the surface casing “in the well . . . set below the depth of usable quality water.”³³⁰ The Commission’s rules also “include strict well construction requirements that [specify that] several layers of steel casings . . . [shall be utilized] to protect groundwater.”³³¹ The rules also require that the production casing be “permanently cemented in place.”³³²

325. MILES HOGAN, LESSONS FROM THE WEST: FRACKING AND WATER RESOURCES 9 (2012), <https://law.ucdavis.edu/centers/environmental/files/FrackingLessonsFromWest.pdf> (citing ADMIN. § 3.13 (describing general well casing requirements)); see also ADMIN. § 3.14 (describing casing requirements for plugging a well); ADMIN. § 3.95 (describing casing requirements for underground storage of liquid or liquefied hydrocarbons in salt formations); R.R. COMM’N OF TEX., *supra* note 320 (follow “HOW IS HYDRAULIC FRACTURE FLOWBACK FLUID DISPOSED OF?” hyperlink).

326. ADMIN. § 3.13(a).

327. Molly Hennessy-Fiske, *In Denton, Texas, Voters Approve ‘Unprecedented’ Fracking Ban*, L.A. TIMES (Nov. 7, 2014, 7:19 PM), <http://www.latimes.com/nation/la-na-texas-fracking-20141108-story.html>.

328. See *id.*

329. R.R. COMM’N OF TEX., *supra* note 320 (follow “DOES THE RAILROAD COMMISSION REGULATE WATER WITHDRAWALS BY THE NATURAL GAS DRILLING COMPANIES FOR HYDRAULIC FRACTURING?” hyperlink).

330. *Id.* (follow “HOW DOES THE COMMISSION PROTECT GROUND WATER?” hyperlink).

331. *Id.*

332. *Id.*

6. Recent Updates

While Texas's approach to regulating fracking provides a great deal of freedom to municipalities,³³³ local jurisdictions can go beyond the baseline state-level standards if they choose. For example, in November 2014, the town of Denton passed the first fracking ban in the state.³³⁴ In response to this, the Texas legislature passed a law stating that localities may not ban fracking in May 2015.³³⁵ This law represents a major departure from Texas's long-held tradition of local home rule and giving municipalities the "broad authority to manage the local impacts of industries."³³⁶ The state's assumption of historically local power may signal that localities' efforts to ban a technology actually backfire when they attempt to contravene a state-supported technology.³³⁷ Tensions between localities seeking to govern themselves and the state of Texas will likely continue to build over this issue.

E. Gaps in State Regulation

The four states surveyed here have made promising steps in regulating fracking—particularly in terms of requiring disclosure of chemicals used in fracking operations and specifying construction and maintenance techniques for casing and well pipes. However, there are still many opportunities for states to create a comprehensive and responsibly-managed fracking scheme. Specifically, there are gaps in terms of water and air regulation, as evidenced by Texas's large number of air quality complaints and low enforcement rate.

Further, even in states like Colorado that have a detailed and specific list of fracking regulations—and in fact, Colorado seems to also be a leader in governing traditionally local issues such as dust and other nuisances—there are still gaps around many of the local impacts described in Part IV below. In addition to some of the larger gaps noted above, such as insufficient air and water regulation, less tangible aspects of fracking have also been left unaddressed. For example, no state studied here has addressed how hydraulic fracturing may affect communities' social or economic welfare, such as impacts on property values or fracking's effects on tax revenue.

Likewise, although the social tensions and financial risks arising from fracking operations—including increased prices of the housing stock, commodity prices, crime, and substance abuse—have been documented in the academic literature,³³⁸ the case studies in Part V show that

333. See Hackney, *supra* note 308, at 658.

334. Hennessey-Fiske, *supra* note 2.

335. Driver & Wade, *supra* note 2.

336. Josh Galperin, *Fracking News: Texas Bans Bans*, YALE CTR. FOR ENVT'L. L. & POL'Y (May 29, 2015), <http://envirocenter.yale.edu/news/fracking-news-texas-bans-bans>.

337. See *id.*

338. Baker, *supra* note 159, at 266–67.

the regulation of many of these non-environmental impacts have not yet been widely implemented on the ground. The majority of these gaps are areas of regulation with almost entirely local effects, and most are non-environmental in nature. For example, there do not appear to be any ordinances addressing the environmental impacts from increased sand mining and processing, or the adverse effects on farming and farmland preservation. There are also no regulations targeting the effects of increased fracking on the local housing market due to increased scarcity and cost, or hedging against adverse effects on property values. We also did not find any governance systems that address or capitalize on charitable contributions, local employment, the effect of increased tax revenue, or revenue from leasing and royalties. Given the wide variety and extent of impacts that address the environmental effects of fracking—from regulating groundwater depletion to noise pollution—this lack of regulation addressing non-environmental aspects of fracking provides an opportunity for local governments to act.

III. LOCAL LAND USE AUTHORITY

The importance of local governance in hydraulic fracturing is now receiving much-needed attention.³³⁹ And the timing is right, as 2016 was the hundredth anniversary of America's first zoning ordinance.³⁴⁰ Prior to assessing how local governments should regulate hydrofracking and its impacts, however, it is critical to understand what the sources of local power are and from where they originate.

Most state constitutions vest in their legislatures all of the legislative authority for the state, which allows states to “enact laws [to] regulate, prohibit, or require certain conduct, provided that such laws have some reasonable relation to the public health, safety, morals, or welfare.”³⁴¹ This is commonly known as the “police power,” under which zoning regulations are enacted and enforced.³⁴² Generally, state legislatures have chosen to delegate these land use powers to local governments.³⁴³

339. See, e.g., Minor, *supra* note 192, at 62; John R. Nolon & Steven E. Gavin, *Hydrofracking: State Preemption, Local Power, and Cooperative Governance*, 63 CASE W. RES. L. REV. 995, 995, 998 (2013); Jesse J. Richardson, Jr., *Local Regulation of Hydraulic Fracturing*, 117 W. VA. L. REV. 593, 593–94, 596 (2014); Scott Martin, Note, *What the Frack?! How Local Zoning Laws Keep Dangerous Mining Techniques Off Our Property*, 21 J. ENVTL. & SUSTAINABILITY L. 209, 218–19 (2015).

340. CITY OF N.Y. BD. OF ESTIMATE & APPORTIONMENT, BUILDING ZONE RESOLUTION (N.Y. 1916), <http://biotech.law.lsu.edu/cphl/history/laws/1916NYCcode.htm>; Amanda Erickson, *The Birth of Zoning Codes, a History*, CITYLAB (June 19, 2012), <https://www.citylab.com/equity/2012/06/birth-zoning-codes-history/2275>.

341. PATRICIA E. SALKIN, 1 AMERICAN LAW OF ZONING § 2.2 (5th ed. 2017); see, e.g., N.Y. CONST. art. III, § 1.

342. SALKIN, *supra* note 341; see, e.g., N.Y. CONST. art. III, § 1.

343. SALKIN, *supra* note 341.

Zoning as a form of regulatory power first began in the early twentieth century.³⁴⁴ Before that time, governments had made very little use of the police power to regulate land development and uses.³⁴⁵ In the beginning, zoning was considered a “radical departure from the traditional private property concepts, because it was perceived as prohibiting a citizen from devoting his property to a purpose useful and entirely harmless, in the ordinary sense, in certain districts within a community.”³⁴⁶ Yet courts upheld the exercise of such powers to promote orderly segregation of industrial, commercial, and residential uses in bustling, growing communities.³⁴⁷ In prohibiting uses from certain districts, localities (and the courts which upheld their ordinances) relied on nuisance and “general welfare” rationales.³⁴⁸ Zoning codes, in their earliest stages, sought to regulate the kinds of nuisance and harms that could only be addressed prior by use of restrictive covenants, building codes, or injunctions.³⁴⁹ Prohibiting certain uses or preferring “higher uses” for a district effectively acted as injunctions against the nuisances of non-preferred uses.³⁵⁰ Meanwhile, policy makers generally thought that zoning contributed to the people’s general welfare by assuring orderly development and increased public services.³⁵¹

The first zoning ordinance in the United States was the 1916 Zoning Resolution of the City of New York, which the New York Court of Appeals upheld as constitutional.³⁵² That resolution and court decision subsequently sparked a widespread adoption of state zoning enabling statutes and implementation of zoning codes.³⁵³ The Advisory Committee on City Planning and Zoning, part of the U.S. Department of Commerce, published a Model Standard State Zoning Enabling Act in 1922, which served as a model that many state legislatures followed in delegating zoning powers to their local governments.³⁵⁴ The Committee also published a companion guide in 1928, known as A Standard City Planning

344. *Id.* § 7:1.

345. *Id.*

346. SARA C. BRONIN & DWIGHT H. MERRIAM, 1 RATHKOPF’S THE LAW OF ZONING AND PLANNING § 1:2 (4th ed. 2017).

347. *See* SALKIN, *supra* note 341, § 7:1.

348. BRONIN & MERRIAM, *supra* note 346.

349. *Id.*; *see, e.g.*, *Hadachek v. Sebastian*, 239 U.S. 394, 404–05 (1915).

350. BRONIN & MERRIAM, *supra* note 346; *see, e.g.*, *Portage Twp. v. Full Salvation Union*, 29 N.W.2d 297, 302 (Mich. 1947).

351. BRONIN & MERRIAM, *supra* note 346; *see, e.g.*, *Village of Euclid v. Ambler Realty Co.*, 272 U.S. 365, 387–89 (1926).

352. BRONIN & MERRIAM, *supra* note 346; *see also* *Lincoln Trust Co. v. Williams Bldg. Corp.*, 128 N.E. 209, 209–10 (N.Y. 1920); CITY OF N.Y. BD. OF ESTIMATE & APPORTIONMENT, *supra* note 340.

353. BRONIN & MERRIAM, *supra* note 346.

354. *See* BRONIN & MERRIAM, *supra* note 346; *see also* ADVISORY COMM. ON ZONING, U.S. DEP’T OF COMMERCE, A STANDARD STATE ZONING ENABLING ACT UNDER WHICH MUNICIPALITIES MAY ADOPT ZONING REGULATIONS (rev. ed. 1926), https://planning-org-uploaded-media.s3.amazonaws.com/legacy_resources/growingsmart/pdf/SZEnablingAct1926.pdf.

Enabling Act.³⁵⁵ In 1926, the U.S. Supreme Court definitively affirmed the ability of localities to zone when the Court upheld the zoning ordinance of the Village of Euclid, Ohio.³⁵⁶ Further, by 1931, every state had authorized zoning and “over 1,000 municipalities had adopted zoning codes.”³⁵⁷

Today, it is well established that municipal governments have been delegated legitimate zoning powers to assure orderly development and regulate for the health, safety, and welfare of their residents.³⁵⁸ The following Sections provide an overview of the most common types of delegated powers and the source of those powers.

A. Home Rule Powers

Municipal home rule powers are one means by which local governments may regulate the impacts of hydraulic fracturing. Municipal home rule powers include grants of authority stemming from either state constitutions or enabling legislation that allow localities to zone and regulate land uses.³⁵⁹ Local home rule systems are complex and are not easily sorted into distinct categories,³⁶⁰ but this Part provides an overview of the most common systems.

The two broadest home rule categories are constitutional home rule powers and statutory home rule powers; however, localities do not easily fall into one category or the other.³⁶¹ Constitutional home rule states grant municipalities power directly from the state constitution, while localities in legislative home rule states draw their power from legislative acts.³⁶² In some states, municipalities possess a combination of constitutional and legislative home rule powers, or are only permitted to exercise certain constitutional home rule powers after adopting a municipal charter.³⁶³ In each of the above cases, municipal power must be exercised in a manner consistent with the general law of the state, and may be constrained by limits set by the general law of the state, the local charter, or both.³⁶⁴

In New York, for example, it is the state enabling legislation—the Municipal Home Rule Law—that grants localities their zoning power;

355. ADVISORY COMM. ON CITY PLANNING & ZONING, U.S. DEP'T OF COMMERCE, A STANDARD CITY PLANNING ENABLING ACT (1928), <http://nvlpubs.nist.gov/nistpubs/Legacy/BH/nbsbuildinghousing11.pdf>.

356. *Village of Euclid*, 272 U.S. at 397.

357. BRONIN & MERRIAM, *supra* note 346.

358. See Michael Lewyn, *New Urbanist Zoning for Dummies*, 58 ALA. L. REV. 257, 263 (2006) (citing Jerry Frug, *The Geography of Community*, 48 STAN. L. REV. 1047, 1091 (1996) (re-marking that Euclidean zoning has become nearly universal in use throughout the United States)).

359. SALKIN, *supra* note 341, § 2:7.

360. *Id.*

361. *Id.*

362. See *id.*; BRONIN & MERRIAM, *supra* note 346, § 1:11.

363. SALKIN, *supra* note 341, § 2:7.

364. *Id.* §§ 2:7 to :8; see also BRONIN & MERRIAM, *supra* note 346, § 1:11.

courts have refused to hold that local governments can draw the power to zone directly and solely from the state constitution.³⁶⁵ In Pennsylvania, the Municipalities Planning Code delegates to localities the authority for zoning, planning, enacting subdivision and land use controls, and creating planned developments.³⁶⁶ Moreover, a constitutional provision in Texas gives home rule powers to cities with a population larger than 5,000, allowing them to regulate for the health, safety, and welfare of their citizens, while the state legislature delegates authority to municipalities with populations below 5,000.³⁶⁷

Colorado, on the other hand, illustrates how complex the delegation of authority to local governments can become:

There are five different types of local governments in Colorado: home-rule municipalities [via a constitutional provision authorizing localities to grant themselves home-rule powers by charter], statutory municipalities [which have only those powers explicitly granted to them by Titles 29 and 31 of Colorado's Revised Statutes, including zoning], home-rule counties, statutory counties, and special districts.³⁶⁸

B. Police Powers

Zoning regulations that restrict development and use of land stem from municipal police powers, which enable localities to regulate for the general health, safety, and welfare of their residents.³⁶⁹ Granted by enabling legislation or state constitution (depending on the legislatures' delegation of power), police powers address the regulation of uses that go beyond merely dictating in which districts they may take place.³⁷⁰ The police power is the basis for a wide variety of land use regulations, in-

365. See N.Y. CONST. art. IX; N.Y. MUN. HOME RULE L. § 10 (McKinney 2017); SALKIN, *supra* note 341, § 2:6.

366. 53 PA. CONS. STAT. § 10105 (2017); see also JOHN BOURDEAU, 22A SUMMARY OF PENNSYLVANIA JURISPRUDENCE MUNICIPAL AND LOCAL LAW § 14:47 (2d ed. 2017).

367. TEX. CONST. art. 11, § 5; see *infra* Section V.B.4. for more detail on Texas' delegation of authority to municipalities.

368. Minor, *supra* note 192, at 90 (citing Robert M. Linz, *Researching Colorado Local Government Law*, 38 Colo. Law. 101, 101 (2009); see also COLO. CONST. art. XX, § 6; COLO. REV. STAT. § 31-15-401 (2017)).

[The Colorado constitution] enumerates many broad powers, including eminent domain, taxation, and election holding. But home rule powers are broader than those listed in the Constitution. Section 6 also grants home rule municipalities 'all other powers necessary, requisite or proper for the government and administration of its local and municipal matters,' and states that the enumeration of powers should not be construed to deny them 'any right or power essential or proper to the full exercise of [self-government] right[s].'" Section 6 provides that state law is superseded by ordinances passed pursuant to home rule charters.

Minor, *supra* note 192, at 90 (alteration in original) (quoting COLO. CONST. art. XX, § 6).

369. *Lawton v. Steele*, 152 U.S. 133, 136 (1894); BRONIN & MERIAM, *supra* note 346, § 1:8; see also *City of Albany v. Anthony*, 262 A.D. 401, 403 (N.Y. App. Div. 1941) (distinguishing between zoning ordinance and nonzoning police power ordinances, zoning ordinances are traditionally aimed at directly controlling where a use takes place as opposed to how it takes place).

370. BRONIN & MERIAM, *supra* note 346, § 1:8.

cluding, but not limited to: historic landmark district restrictions, environmental controls, architectural and aesthetic regulations, affordable housing mandates, and more.³⁷¹ A zoning ordinance enacted pursuant to a municipality's police power will only be held valid if it furthers an objective that is expressly or impliedly authorized by the state enabling statute.³⁷²

Some localities are currently using their police powers to regulate fracking, as will be discussed in more depth in Part V. For example, Arlington, Texas, has implemented a gas well permitting system that ensures developers will site wells in areas that minimize impacts on the community and may impose additional conditions such as proper landscaping screening and the enforcement of basic safety standards.³⁷³ Though an updated ordinance has been crafted in Peters Township, Pennsylvania, it will retain many features of the current regulations, which include provisions limiting noise, odor, and dust disturbances, a requirement for pre- and post-fracking water testing, and an emphasis on roadway safety and maintenance.³⁷⁴

C. Preemption

1. Legal Nature

Municipalities may only exercise the authority granted to them by a state statute or constitution, and may not exceed the limitations inherent to this delegatory scheme. Otherwise, the ordinance is in direct conflict with the constitution or statute that delegates the power.³⁷⁵ Additionally, a number of states explicitly specify that "municipal legislation is valid only to the extent that it does not conflict with the general law of the state" (which includes the constitution as well as the general statutes of the state).³⁷⁶ Express preemption exists when the state legislature, in specific and unambiguous terms, preempts local action in order to further the interests of the state.³⁷⁷ For example, a state may expressly limit local authorities' power to regulate the location of airports.³⁷⁸ Implied preemp-

371. *Id.*

372. SALKIN, *supra* note 341, § 7:1.

373. ARLINGTON, TEX., ORDINANCE 11-068 (2011), <http://www.arlington-tx.gov/cityattorney/wp-content/uploads/sites/15/2014/05/GasDrilling-Chapter.pdf>; see also Brett Shipp, *Arlington Officials Report on Fracking Fluid Blowout*, WFAA (June 17, 2015, 1:32 PM), <http://www.wfaa.com/story/news/local/tarrant-county/2015/06/16/arlington-officials-report-on-fracking-fluid-blowout/28844657> (explaining that despite these best efforts, however, Arlington was the site of a well blowout that spilled over 42,000 gallons of fracking fluid into residential neighborhoods).

374. PETERS TOWNSHIP, PA., ORDINANCE 737 (2011), http://www.peterstownship.com/vertical/sites/%7B3BE5B086-2A15-4083-A63D-16B3DD03C8DD%7D/uploads/Minera_Extraction_Ord_final_version_737_8-2-11.pdf.

375. SALKIN, *supra* note 341, § 6:28.

376. *Id.*

377. Jessica A. Bacher & John R. Nolon, *Mitigating the Adverse Impacts of Hydraulic Fracturing: A Role for Local Zoning?*, 37 No. 9 ZONING & PLAN. L. REP., Oct. 2014, at 1.

378. See, e.g., *Petition of Detroit (Airport Site)*, 14 N.W.2d 140, 142 (Mich. 1944).

tion, on the other hand, occurs when a state regulation does not explicitly prohibit localities from regulating in a certain arena, but the local law appears to conflict with the state interests at hand.³⁷⁹ In this case, it is up to the judiciary to determine whether there is either an irreconcilable conflict created by the local law with state regulation, or whether the state law “occup[ies] the field” to the extent that local regulation is automatically preempted.³⁸⁰ When a conflict is found between a state law and a local ordinance, the local ordinance must always give way to the state regulation.³⁸¹ For example, a locality is permitted to zone business classes—liquor stores, for instance—into specific areas, but cannot totally prohibit the sale of liquor within its jurisdiction when the state has licensed liquor sales.³⁸² This is because a complete prohibition contradicts the implied interests of the state.

Many states have enacted comprehensive oil and gas legislation that regulates how fracking operations are carried out, which preempt localities from adding additionally restrictive or contrary regulations.³⁸³ This is a particularly contentious issue in the context of fracking, as local regulations that severely restrict or prohibit drilling can frustrate state economic objectives. For example, elements of the drilling process that are preempted from local control might include the placement of boreholes and well casing regulations.³⁸⁴ However, several states have upheld localities’ use of zoning power to determine the locations where fracking can take place. This can be accomplished by restricting drilling activities to certain drilling districts (e.g. the industrial district),³⁸⁵ or by use of the police power to implement a permitting scheme or passing ordinances regulating nuisance effects such as road wear, noise, odor, and dust.³⁸⁶

In Pennsylvania, local governments are expressly preempted from mandating the thickness of well casings or the type of equipment that drillers use.³⁸⁷ Yet despite these state-level limitations, the Supreme Court of Pennsylvania has upheld that Pennsylvania localities do have the legal authority to regulate where fracking may take place within their

379. Bacher & Nolon, *supra* note 377.

380. *Id.*

381. SALKIN, *supra* note 341, § 6:28.

382. *See id.*; *see also, e.g.*, *Town of Fenton v. Tedino*, 401 N.Y.S.2d 397, 401 (N.Y. Sup. Ct. 1974); *Twp. of Spring v. Majestic Copper Corp.*, 256 A.2d 859, 859–60 (Pa. 1969).

383. *See, e.g.*, COLO. REV. STAT. §§ 34-60-102 to -130 (2017); 58 PA. CONS. STAT. §§ 3202–74 (2017); N.D. CENT. CODE §§ 38-08-01 to -22-23 (2017); TEX. NAT. RES. CODE ANN. §§ 81.002 to 123.005 (2017).

384. *See, e.g.*, COLO. REV. STAT. §§ 34-61-102, -105.

385. *See, e.g.*, *Range Res.-Appalachia, LLC v. Salem Twp.*, 964 A.2d 869, 872 (Pa. 2009); *Huntley & Huntley, Inc. v. Borough Council*, 964 A.2d 855, 858–59 (Pa. 2009).

386. *See, e.g.*, PETERS TOWNSHIP, PA., ORDINANCES no. 737, § 713(O) (2011), http://www.peterstownship.com/vertical/sites/%7B3BE5B086-2A15-4083-A63D-16B3DD03C8DD%7D/uploads/Minera_Extraction_Ord_final_version_737_8-2-11.pdf (discussed in more detail *infra* Section V.B.3.).

387. *See Range Res.-Appalachia*, 964 A.2d at 875; *Huntley*, 964 A.2d at 861.

jurisdiction.³⁸⁸ In Colorado, the state's Supreme Court has determined that localities, such as Longmont and Fort Collins, do not possess the authority to constitutionally ban fracking within their borders; such action is preempted by the state oil and gas law, as bans arguably run counter to the state's interests in exploiting natural gas deposits.³⁸⁹

2. Politics and the Local Governance of Fracking

Preemption has become one of the central battlegrounds in the fracking debate. State governments, for example, may seek to increase oil and gas exploration, while local governments may remain sensitive to residents' concerns regarding the lifestyle, environmental, health, and economic risks of fracking. When states endeavor to overturn local regulations related to fracking, a key question is whether the local fracking rules are really different from other, well-established local regulations, or whether they are simply addressing an issue that is currently a political minefield.

D. Nonregulatory Governmental Approaches

In addition to traditional regulatory techniques, nonregulatory approaches can also be effective tools to address the impacts of hydraulic fracturing, whether used alone or in conjunction with regulatory measures. One of the most common nonregulatory approaches is crafting a community benefits agreement (CBA)—a site-specific, legally enforceable agreement between local government, the community, and a developer.³⁹⁰ A CBA lays out the project's benefits to the community and ensures the community's support of the project.³⁹¹ Allowing the community and the developer to engage in a more collaborative negotiation process than what is afforded under the usual land use application process, the developer minimizes risk while community members enjoy an increased degree of input to ensure the project is tailored to meet the unique needs of their locale.³⁹² Over the past two decades, CBAs have gained a higher profile in the land use processes in several states, such as New York and California, where they are employed to address a wide range of environmental and social-justice concerns.³⁹³ Though the scenarios involved in drilling are not analogous to a CBA's usual applica-

388. See *Range Res.-Appalachia*, 964 A.2d at 872–73; *Huntley*, 964 A.2d at 864.

389. *City of Longmont v. Colo. Oil & Gas Ass'n*, 369 P.3d 573, 578 (Colo. 2016).

390. JULIAN GROSS ET AL., COMMUNITY BENEFITS AGREEMENTS: MAKING DEVELOPMENT PROJECTS ACCOUNTABLE 9 (2005); *Community Benefits 101*, PARTNERSHIP FOR WORKING FAMILIES, <http://www.forworkingfamilies.org/resources/policy-tools-community-benefits-agreements-and-policies> (follow “The Basics” hyperlink) (last visited Sept. 9, 2017).

391. GROSS ET AL., *supra* note 390, at 9–10.

392. *Id.*

393. Patricia E. Salkin & Amy Levine, *Understanding Community Benefits Agreements: Equitable Development, Social Justice and Other Considerations for Developers, Municipalities and Community Organizations*, 26 UCLA J. ENVTL. L. & POL'Y 291, 300 (2008); Center for N.Y. Law, *The NYC Bar Ass'n Reports on CBAs In NYC's Land Use Practice*, 16 CITY L. 49 (2010).

tions (for example, to a single development site such as a stadium project), modifications to the process could be made in order to enhance negotiations between community members, local government, and industry.³⁹⁴

Another nonregulatory approach is executing a memorandum of understanding (MOU), also known as a “letter of intent.”³⁹⁵ An MOU effectively memorializes in writing the signing parties’ intentions to enter into a formal contract, but does not legally bind the parties to adhering to the terms of the MOU.³⁹⁶ In terms of its applicability to hydraulic fracturing, local governments may use an MOU to air concerns and negotiate with industry without the pressure of adopting or adhering to formal regulatory measures.³⁹⁷ Finally, keeping open clear, direct, and honest lines of communication can greatly enhance the relationship between local government officials and industry operators, which greatly aids a locality’s mission to effectively address impacts of concern.³⁹⁸

Given the scope and history of local land use and environmental authority, governing fracking *qua* fracking is not the best tactic for controlling its impacts. Rather, local governments should govern fracking as they do other local industries because, while fracking does present local concerns and impacts that are distinct from other industries, at its core, fracking is merely another industry. Thus, by addressing fracking through those impacts that cause the most concern to local communities, it is easier to highlight the ways in which local governments can address those concerns using their familiar local powers. The following Part describes the ways in which these local powers overlap with the identified impacts of fracking.

IV. IDENTIFYING THE LOCAL IMPACTS OF HYDRAULIC FRACTURING

The federal and state governance systems do address a range of impacts from hydraulic fracturing, but a gap remains at the local level. Communities must cope with a set of impacts that are uniquely local in nature that federal and state regulations do not address, but local governments can for the most part manage these impacts by using traditional local governance tools. The authors of this Article, along with colleagues at Yale University and Pace University School of Law, undertook a project from 2013 to 2015 to catalogue and analyze the local impacts of hydraulic fracturing. In this Article, we provide our list of local fracking impacts as an illustration of major local concerns. The next Section de-

394. See William Yukstas, Note, *Managing Fractions: The Role of Local Government in Regulating Unconventional Natural Gas Resources – Recommendations For New York*, 11 CARDOZO PUB. L. POL’Y & ETHICS J. 563, 595–603 (2013).

395. *Letter of Intent*, BLACK’S LAW DICTIONARY (10th ed. 2014).

396. *Id.*

397. See *infra* Section V.B.1. (discussing Erie, Colo.).

398. See *infra* Section V.B.4. (discussing Arlington, Tex.).

scribes the methods we used to catalogue local impacts, followed by a table illustrating those impacts. A complete list is available as an online appendix at www.bit.ly/frackingdatabase.

A. Methods

1. Project Origins

This project began in 2013 in a joint effort between the Yale Center for Environmental Law & Policy (YCELP), Yale Climate & Energy Institute, and Pace Law School's Land Use Law Center. Our overarching goals were to understand how local governments can fill fracking regulatory gaps at the federal and state levels, and to empower local government decision making on a range of challenges that shale oil and gas development pose. We hypothesized that outright fracking bans risk state preemption and uncontrolled drilling risks negative environmental and community impacts. Thus, our work has sought to support municipal leaders in developing balanced and effective regulatory and nonregulatory practices to address the effects of fracking. These practices would ideally mitigate land use and environmental damage, while preserving economic, social, and community benefits. We believe that, equipped with the proper tools, local authorities can effectively govern most aspects of fracking.

2. Meeting with Stakeholders

Our process has involved two stages. First, we focused on research, analysis, and stakeholder outreach to identify local impacts from fracking. Second, we investigated local government strategies to manage those impacts. Initially, we endeavored to synthesize fracking's local effects and incorporate local communities' concerns. These concerns include those founded on environmental impacts as well as social and economic impacts. Some impacts are clear and well documented, while others are speculative or largely unfounded. Nevertheless, we believe that only with an understanding of community concerns can local leaders address the tangible and intangible impacts of a significant new industry such as fracking.

To begin this process, we identified a variety of local fracking impacts based on data previously collected by the nonprofit organization Food and Water Watch.³⁹⁹ The Food and Water Watch data aggregated local resolutions, ordinances, and other legislative actions to ban hydraulic fracturing. Our team then accessed these legislative actions and, by reviewing the legislative findings of each, extracted details on the issues about which local governments were expressing concern.

399. Mary Grant, *Local Resolutions Against Fracking*, FOOD & WATER WATCH (July 28, 2017), <http://www.foodandwaterwatch.org/insight/local-resolutions-against-fracking>.

These local actions ultimately included impacts that were well documented in the scientific literature as well as impacts that were less well researched, speculative, or unfounded but still deeply worrisome to community members. Our list does not seek to distinguish among these categories of impacts. Instead, we seek to provide sufficient information for local leaders to make informed decisions about how to manage hydraulic fracturing in their jurisdictions based on the concerns of their constituents. At the same time, we provide access to scientific literature, news reports, and other assessments of the science to help inform decision making with subjective and objective information.

After consolidating these initial impacts, we sought to verify and understand firsthand the challenges that local governments might face. To do this, we held an expert panel and roundtable workshop in December 2013 at the Pace Land Use Law Center's annual conference.⁴⁰⁰ This session involved key participants from local governments, advocacy groups, academia, and industry. At this meeting, the team presented the preliminary impacts list and incorporated additional impacts based on feedback from meeting participants. This session showed us that the impacts highlighted in local bans presented a one-sided perspective. As a result, we widened the project's focus to include beneficial aspects of shale development, relying heavily on the work of Daniel Raimi and Richard Newell at Duke University.⁴⁰¹

Building on the momentum from the December 2013 conference, we facilitated a second discussion at the Yale Law School in March 2014.⁴⁰² This latter session focused on local strategies and best practices for governing unconventional oil and gas development. The discussion also centered on issues of state preemption of local authority, and included examples of local land use efforts in various states addressing the impacts of fracking.⁴⁰³ With input from current or former local government officials in Pennsylvania, Texas, and New Mexico, the workshop demonstrated that local governments have a strong capacity to address the impacts of hydraulic fracturing and vary widely in both approaches and strategies.⁴⁰⁴

400. Antonio Soares, *Hydro-Fracking LULC 12-05-13*, PACE UNIV. MEDIASPACE (Dec. 6, 2013), https://mediaspace.pace.edu/media/Hydro-Fracking+LULC+12-05-13/1_p21ysyb7/31792771.

401. *Shale Public Finance: Local Government Fiscal Impacts of Oil and Gas Development*, DUKE ENERGY INITIATIVE, <http://energy.duke.edu/shalepublicfinance> (last visited Oct. 2, 2017).

402. See *Workshop Materials and Further Resources: March 2014 Workshop Materials*, LAND USE COLLABORATIVE, <http://sites.environment.yale.edu/collaborative/2015/08/11/hydraulic-fracturing> (follow "Workshop Materials and Further Resources" hyperlink) (last visited Sept. 11, 2017).

403. *Id.*

404. *Id.*

3. Building the Impacts List

Throughout 2014, we expanded the impact list to include two additional types of resources beyond positive and negative community impacts. First, we explored the peer-reviewed and gray literature, as well as news media to collate information on each of the impacts that our research identified. Second, we scoured local hydraulic fracturing regulations from across the country in order to find templates, models, and examples of the types of strategies local governments use to address impacts of local concern.

The goal of including resources and regulatory strategies in the impact list was ultimately to create an online database where local officials could find thorough and varied fracking research to support their own decision making and leadership.

To do this, we gathered resources on each of the impacts the research team reviewed. We collected the available literature and consulted with experts to identify potential resources that explain, document, contextualize, or substantiate the impact. Some potential impacts, such as groundwater pollution from stray gas or fracking chemicals, have been subject to scientific study and subsequently documented in peer-reviewed literature.⁴⁰⁵ Other impacts, like the increase in demand for local government services and a reduction in local government workforce retention are not as well documented.⁴⁰⁶ Where possible, the framework provides links to authoritative, peer-reviewed journal articles with an objective perspective on the impact. Where peer-reviewed resources were not available, the framework provides either non-peer-reviewed studies or news reports with useful coverage of the impact. Containing more than 150 resources and links documenting and contextualizing potential local impacts, the framework represents a significant step towards equipping local governments with foundational knowledge to manage shale development.

To understand how the environmental, financial, and social consequences of fracking are incorporated into local law and policy, we then collected town resolutions and ordinances to augment those provided by Food and Water Watch. We surveyed a wide range of local ordinances and policy measures to procure a variety of regulatory and nonregulatory governance options for local authorities to consider. Then, we paired

405. See *infra* Section IV.B. (discussing how the harms of groundwater pollution from stray gas or fracking chemicals has been documented in the journal *Environmental Earth Sciences*, among others); see also Birgit C. Gordalla, Ulrich Ewers & Fritz H. Frimmel, *Hydraulic Fracturing: A Toxicological Threat for Groundwater and Drinking-Water?*, 70 ENVTL. EARTH SCI. 3875, 3876 (2013).

406. See *infra* Section IV.B. Though many local municipalities have identified an increased demand for local government services as an impact of fracking, no peer-reviewed journal has addressed this challenge. See *infra* Section IV.B., “Community and Government: Provision of Local Government Services” and “Community and Government: Workforce Retention,” among others.

these local legal and policy strategies to corresponding impacts. While the measures and impacts in the framework are not exhaustive, the database provides a substantial resource and reference point for local governments seeking to secure local economic advantages, while safeguarding against potential negative effects from shale gas development.

At present, the impacts framework, summarized in Section V.B., and available in its entirety online in an interactive online format (*see* Appendix 1) or a static document (*see* Appendix 2), contains nearly forty unconventional oil and gas local impacts across the environmental, socio-economic, and public health spectrum that correspond with local measures that address these challenges. As stated above, while the catalogue of impacts is not an exclusive list of challenges a community may face, nor a complete picture of the potential benefits, the compiled list demonstrates the range of challenges a locality may face depending on local context. We seek to provide a balanced resource for governments seeking precedents of how other localities are addressing fracking, and suggest how governments might incorporate concerns of the scientific community, environmental advocates, industry, and local community members into municipal policy.

B. The Local Impacts of Hydraulic Fracturing

As noted above, we have compiled nearly forty oil and gas impacts of fracking across multiple areas of concern. The following list sets forth the impacts that we have surveyed, with more information located in the footnotes. For the online interactive database of these impacts, please see Appendix 1. See Appendix 2 for a static database saved as a PDF.

Local Impacts
Agriculture: Farming and Farmland Preservation ⁴⁰⁷
Agriculture: Farmland Preservation ⁴⁰⁸

407. See ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01B (2011), <http://www.arlington-tx.gov/cityattorney/wp-content/uploads/sites/15/2014/05/GasDrilling-Chapter.pdf> (creating setback requirements); MCKENZIE COUNTY, N.D., ZONING ORDINANCE art. I., § 1.2 (2016), http://county.mckenziecounty.net/usrfiles/Zoning_Ordinance_9-20-2016.pdf; PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(16) (2017), <http://www.ecode360.com/attachment/PE3557/Peters%20Township%20Zoning%20Ordinance%20-%20August%202017.pdf> (establishing compressor stations locations); MCKENZIE CTY., MCKENZIE COUNTY COMPREHENSIVE PLAN 1-1 (2016), [hereinafter MCKENZIE COUNTY COMPREHENSIVE PLAN], http://planmckenzie.com/wp-content/uploads/2016/06/McKenzieCountyComprehensivePlan_FINAL-1.pdf (last visited Sept. 16, 2017) (creating a town-wide comprehensive plan and establishing economic development strategies).

408. See Jon Hurdle, *Fracking Under a Historic Farm*, N.Y. TIMES: GREEN (Mar. 1, 2013 1:42 PM), <http://green.blogs.nytimes.com/2013/03/01/fracking-to-unfold-under-a-historic-farm>; Teri Weaver, *NY Farmers Reject Anti-Hydrofracking Position at Farm Bureau Meeting*, SYRACUSE.COM (Dec. 4, 2013),

Community and Government: Civic Discourse, Community Character, and Crime ⁴⁰⁹
Community and Government: Provision of Local Government Services ⁴¹⁰
Community and Government: Workforce Retention ⁴¹¹
Economy: Charitable Contributions ⁴¹²
Economy: Local Economic Development ⁴¹³
Economy: Local Employment ⁴¹⁴
Economy: Property Values ⁴¹⁵

http://www.syracuse.com/news/index.ssf/2013/12/ny_farmers_reject_anti-hydrofracking_position_at_farm_bureau_meeting.html.

409. See MCKENZIE COUNTY, N.D., ZONING ORDINANCE art. II, § 2.6, art. IV, § 4.8 (addressing the termination of non-conforming uses and addressing temporary workforce housing, respectively); CECIL TOWNSHIP, PA., ORDINANCE no. 2-2010 § 3 (2010), https://pennstatelaw.psu.edu/_file/aglaw/Ordinances/Cecil_Township_2-2010_General.pdf (addressing resident notifications); MCKENZIE COUNTY COMPREHENSIVE PLAN, *supra* note 407, at 6-1 to 6-6 (creating a statement of housing strategies).

410. See ARLINGTON, TEX., ORDINANCE 11-068, art. V, § 5.03, art. VI, 6.01B (requiring burden of proof to fall on the operator and requiring periodic reports); JEFFERSON HILLS, PA., ORDINANCE no. 833, § 5(1)(H)(1) (2014), <http://www.ecode360.com/documents/JE2362/source/LF834323.pdf> (requiring use of a security guard); MCKENZIE COUNTY, N.D., ZONING ORDINANCE art. IV, § 4.8 (providing standards for temporary workforce housing); MIDLOTHIAN, TEX., ORDINANCE no. 2010-12, art. XIII (2010), <http://www.midlothian.tx.us/documentcenter/view/500> (establishing fire prevention measures); NOTTINGHAM TOWNSHIP, PA., ORDINANCE no. 91, art. II, § 3 (2010), https://pennstatelaw.psu.edu/_file/aglaw/Ordinances/Nottingham_Township_No_91.pdf (ensuring pedestrian safety); PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55) (addressing spill cleanup, site security, and accident preparedness); SOUTH FRANKLIN TOWNSHIP, PA. & GREEN HILLS BOROUGH, PA., JOINT ZONING § 185.72(Q) (2014), http://southfranklintwp.org/ZoningOrdinance_Final.pdf (ensuring reimbursement for operator compliance); MCKENZIE COUNTY COMPREHENSIVE PLAN, *supra* note 407 (requiring a statement of government strategies).

411. See Katie Walters, *Watford City's First-Ever Affordable Housing for Public-Service Employees Dedicated*, ROUNDUPWEB.COM (Aug. 14, 2013), <http://www.roundupweb.com/story/2013/08/14/news/watford-citys-first-ever-affordable-housing-for-public-service-employees-dedicated/3160.html>.

412. See TIMOTHY W. KELSEY ET AL., ECONOMIC IMPACTS OF MARCELLUS SHALE IN BRADFORD COUNTY: EMPLOYMENT AND INCOME IN 2010, at 7 (2012), <http://aese.psu.edu/research/centers/cccd/publications/marcellus/economic-impacts-of-marcellus-shale-in-bradford-county-employment-and-income-in-2010>.

413. See, e.g., DANIEL RAIMI & RICHARD G. NEWELL, SHALE PUBLIC FINANCE: LOCAL GOVERNMENT REVENUES AND COSTS ASSOCIATED WITH OIL AND GAS DEVELOPMENT I (2014); ANDREW RUMBACH, NATURAL GAS DRILLING IN THE MARCELLUS SHALE: POTENTIAL IMPACTS ON THE TOURISM ECONOMY OF THE SOUTHERN TIER I (n.d.), [http://catskillcitizens.org/learnmore/MarcellusTourismFinal\[1\].pdf](http://catskillcitizens.org/learnmore/MarcellusTourismFinal[1].pdf) (describing the effect of fracking on tourism).

414. See, e.g., MARCELLUS SHALE EDUC. & TRAINING CTR., PENNSYLVANIA STATEWIDE MARCELLUS SHALE WORKFORCE NEEDS ASSESSMENT *passim* (2011), http://pasbdc.org/uploads/media_items/pennsylvania-statewide-marcellus-shale-workforce-needs-assessment-june-2011.original.pdf (noting the increased need for local workforce); RAIMI & NEWELL, *supra* note 413, *passim* (assessing the potential for an increase in the local tax base).

415. See ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01(B)-(C) (setting bonding and setback requirements, landscaping requirements, and fencing requirements, among other re-

Economy: Revenue from Fee-for-Service Payments ⁴¹⁶
Economy: Revenue from Intergovernmental Transfers ⁴¹⁷
Economy: Revenue from Leasing and Royalties ⁴¹⁸
Economy: Tax Revenue ⁴¹⁹
General Concerns ⁴²⁰
Health and Safety: Health Concerns for Workers ⁴²¹
Health and Safety: Local Health and Emergency Services ⁴²²
Housing: Increased Scarcity and Cost ⁴²³
Infrastructure: Improved Roads ⁴²⁴

strictions); MCKENZIE COUNTY COMPREHENSIVE PLAN, *supra* note 407, at 1-2, 2-1, 2-5 to 2-6 (requiring a statement of land use strategies; building restrictions; and setback restrictions, among other requirements).

416. See ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 5.07(A) (describing a provision where an operator pays annual administrative fees for each permit); BEDFORD, TEX., CODE OF ORDINANCES pt. 1, ch. 79, art. II § 79-22(b), art. V, § 79-72 (2017), https://www.municode.com/library/tx/bedford/codes/code_of_ordinances?nodeId=PTIICOOR_CH79GADRPR (stating which fees must be paid prior to drilling/construction).

417. See, e.g., RAIMI & NEWELL, *supra* note 413, *passim* (describing that states collect taxes and fees associated with fracking operations in localities).

418. See, e.g., *id.* (noting that oil and gas operators on public land pay royalties to the government for use of the land); Jeffrey Jacquet, *Energy Boomtowns & Natural Gas: Implications for Marcellus Shale Local Governments & Rural Communities* 40 (Ne. Reg'l Ctr. for Rural Dev., Working Paper No. 43, 2009), <http://aeae.psu.edu/nercd/publications/rdp/rdp43> (documenting increased local government revenue in Wyoming).

419. See, e.g., N.Y. STATE DEP'T OF ENVTL. CONSERVATION, FACT SHEET: ECONOMICS OF HIGH-VOLUME HYDRAULIC FRACTURING IN NEW YORK STATE, <http://www.empireenergyforum.com/uploads/econimpact092011.pdf>; Charles Costanzo & Timothy W. Kelsey, *State Tax Implications of Marcellus Shale*, PENNSTATE EXTENSION (Aug. 15, 2017), <http://extension.psu.edu/publications/ua468> (describing the increasing local tax revenue accompanying fracking in Pennsylvania).

420. See ARLINGTON, TEX., ORDINANCE no. 11-068, art. VI, § 6.01 (2011), <http://www.arlington-tx.gov/cityattorney/wp-content/uploads/sites/15/2014/05/GasDrilling-Chapter.pdf> (bonding and insurance requirements); PETERS TOWNSHIP, PA., ZONING ORDINANCE § 400.602(55) (2017), <http://www.ecode360.com/attachment/PE3557/Peters%20Township%20Zoning%20Ordinance%20-%20August%202017.pdf> (public safety and permit compliance).

421. See ARLINGTON, TEX., ORDINANCE no. 11-068, art. V, § 5.02 (requiring emergency response plan, hazardous materials management, liability insurance, blowout prevention, fire prevention, and storage tank regulations); CECIL TOWNSHIP, PA., ORDINANCE no. 2-2010, § 3(6) (Mar. 22, 2010), https://pennstatelaw.psu.edu/_file/aglaw/Ordinances/Cecil_Township_2-2010_General.pdf (requiring a first responders plan, and a preparedness, prevention, and contingency plans).

422. BURLESON, TEX., CODE OF ORDINANCES ch. 14, art. VII, div. I, § 14-353 (2017), https://library.municode.com/tx/burleson/codes/code_of_ordinances?nodeId=PTIICOOR_CH14BUARTVIIGADREX_DIVIGE_S14-353CIMA (describing the authority of the city manager's power); CECIL TOWNSHIP, PA., ORDINANCE no. 2-2010, § 3(6); Cross Creek Township, Pa. Ordinance no. 1:11 (Aug. 9, 2011), <http://www.crosscreektwp.org/uploads/oil-and-gas-zoning-amendment-new-draft-2.pdf> (amending ¶ 7(g)(i)) (requiring a Preparedness, Prevention, and Contingency Plan to the first responders and zoning officer); MCKENZIE COUNTY, N.D. ZONING ORDINANCES, art. IV, § 4.8 (2016), http://county.mckenziecounty.net/usrfiles/Zoning_Ordinance_9-20-2016.pdf (providing temporary workforce housing).

423. See Walters, *supra* note 411 (describing the provision of subsidized housing).

Infrastructure: Road Conditions and Safety ⁴²⁵
Land Use: Future Growth and Development ⁴²⁶
Land Use: Local Habitat and Species ⁴²⁷
Land Use: Recreational Space ⁴²⁸

424. See CRANBERRY TOWNSHIP, PA. ZONING ORDINANCES ch. 27, § 27-705(57)(C) (2016), <http://www.ecode360.com/14180109> (requiring the permit applicant to enter into an agreement with the township before, during, and after natural gas development).

425. See, e.g., ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01(A)(22) (requiring that private roads must be approved before usage); BUFFALO TOWNSHIP, PA. ZONING ORDINANCE art. 3, § 312(E) (2009), <http://buffalotownship.com/pdf/zoningordinance0209.pdf> (operator must agree to deal with all necessary road degradation); CECIL TOWNSHIP, PA., ORDINANCE no. 2-2010, § 3(2)–(4) (operator must ensure safeguards to ensure road conditions and pedestrian safety); CROSS CREEK TOWNSHIP, PA. ORDINANCE no. 1:11, (requiring an impervious parking surface); JEFFERSON HILLS, PA. ORDINANCE no. 833, §§ 1(2)(F), 4(1)(B) (2014), <http://www.ecode360.com/documents/JE2362/source/LF834323.pdf> (requiring submission of a road restoration plan); JACKSON TOWNSHIP, PA., ORDINANCE no. 141 § IV(A) (2006), <http://www.jacksontwppa.com/PDF%20Documents/Ordinances/Methane%20Gas%20Ordinance%20141.pdf> (stipulating access road requirements); MOUNT PLEASANT TOWNSHIP, PA., CODE ch. 200, art. XII, § 200-103.1(B)(9) (2017), <http://ecode360.com/11532552#15229488> (providing of inspection of proposed truck routes); MURRYSVILLE, PA., REVISED PENDING ORDINANCE no. 930-15 (2017), <http://murrysville.com/wp-content/uploads/2017/02/Murrysville-Oil-and-Gas-Ordinance-Revised-for-County-Review-February-3-2017-Reduced-size.pdf> (requiring an operator to perform an inspection of proposed truck routes); PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(H) (2017), <http://www.ecode360.com/attachment/PE3557/Peters%20Township%20Zoning%20Ordinance%20-%20August%202017.pdf> (requiring a truck road use plan and requirement to fix property damage); Bd. of Trs. of the Town of Erie, Res. no. 12-74 (Colo. 2012), <http://www.erieco.gov/documentcenter/view/4736> (describing the location of water supply and providing a traffic management plan); MCKENZIE COUNTY COMPREHENSIVE PLAN, *supra* note 407, at 3-19 (requiring a route for preferred heavy traffic network; MCKENZIE CTY., MCKENZIE COUNTY APPROACH PERMIT (2014), http://county.mckenziecounty.net/usrfiles/APPROACH_PERMIT_APPLICATION_FINAL.pdf (holding contractor liable for damages).

426. See, e.g., ARLINGTON, TEX., ORDINANCE no. 11-068, art. VI, § 6.01(B)(1) (requiring an operator to hold a bond); BURLESON, TEX., CODE OF ORDINANCES ch. 14, art. VII, div. I, § 14-353 (noting the city manager's power).

427. See, e.g., AZTEC, N.M., CITY CODE ch. 15, art. II, § 15-12(1)(9) (2013), <http://www.aztecnm.gov/citycode/chapter15-oilgas.pdf> (requiring a wildlife mitigation plan); CECIL TOWNSHIP, PA. ORDINANCE no. 2-2010, § 3(5) (a ban on burning brush, trees, or stumps); FORT WORTH, TEX., ORDINANCE no. 18449-02-2009 (2009), <http://publicdocuments.fortworthtexas.gov/CSODOCS/DocView.aspx?id=4092&searchid=a64088c9-ea99-477b-a3ef-a675e18f855f&dbid=0> (landscaping requirement); JEFFERSON HILLS, PA., ORDINANCE no. 833 § 1(2) (requiring of overlay districts); MOUNTAIN LAKE PARK, MD., ORDINANCE no. 2011-01, art. IV, § 2 (2011), <http://www.harmonywithnatureun.org/content/documents/200Ordinance-Mountain%20Lake%20Park-.pdf> (noting rights of natural communities to exist); MOUNT PLEASANT TOWNSHIP, PA., CODE ch. 200, art. XII, § 200-103.1(B)(4) (setback requirements); MURRYSVILLE, PA., REVISED PENDING ORDINANCE no. 930-15 § 1(3) (defining a Best Management Practice as mitigation measures used to ensure energy development proceeds in an environmentally responsible manner); PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(Z) (requiring compliance with all federal, state, and local laws, ordinances and regulations protecting the environment or environmental matters); RIO ARRIBA COUNTY, N.M. ORDINANCE no. 2009-01, art. 8, § 8.2 (2009), http://www.rio-arriba.org/pdf/2009-01_rio_arriba_county_oil_and_gas_ordinance.pdf (requiring environmental report); Bd. of Trs. of the Town of Erie, Res. no. 12-74 (Colo. 2012) <http://www.erieco.gov/documentcenter/view/4736> (requiring a best management practices).

428. See, e.g., ARLINGTON, TEX., ORDINANCE no. 11-068, art. V, § 5.02(C)(14) (requiring a site restoration plan); JEFFERSON HILLS, PA. ORDINANCE no. 833 § 1(2) (requiring overlay districts);

Pollution: Air ⁴²⁹
Pollution: Groundwater ⁴³⁰
Pollution: Noise ⁴³¹
Pollution: Surface Water ⁴³²
Pollution: Visual ⁴³³

MOUNT PLEASANT TOWNSHIP, PA., CODE ch. 200, art. XII, § 200-103.1(B)(4) (setback requirements); MIDLOTHIAN, TEX., CODE OF ORDINANCES ch. 4, art. 40.6, § 4.06.004 (2016), <http://z2codes.franklinlegal.net/franklin/Z2Browser2.html?showset=midlothianset> note (noting location criteria and specific use permits); NOTTINGHAM TOWNSHIP, PA. ORDINANCE no. 91, art. I, § 1 (2010), https://pennstatelaw.psu.edu/_file/aglaw/Ordinances/Nottingham_Township_No_91.pdf (ensuring pedestrian safety) (describing specific zoning districts); PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(E) (permitted use zones); MCKENZIE COUNTY COMPREHENSIVE PLAN, *supra* note 407, at 4-2 (stating recreation and tourism strategies).

429. See, e.g., ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01(A)(15) (flaring prohibitions, emissions restrictions); MIDLOTHIAN, TEX., CODE OF ORDINANCES ch. 4, art. 4.06, § 4.06.013(a)(13), (17) (muffling exhaust standards and gas emissions); MURRYSVILLE, PA., REVISED PENDING ORDINANCE no. 930-15 § 1; PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(O) (controlling dust and odor); Bd. of Trs. of the Town of Erie, Res. no. 12-74 (Colo. 2012), <http://www.erieco.gov/documentcenter/view/4736> (describing best management practices for the water supply).

430. See ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01(A)(14)–(15), (A)(24), (I) (insurance requirements, wastewater pond regulations, saltwater well prohibitions, and disposal lines regulations).

431. See, e.g., *id.* § 7.01(F); BUFFALO TOWNSHIP, PA., ZONING ORDINANCE art. 6, § 603.5 (hiring an outside consultant); CECIL TOWNSHIP, PA., ORDINANCE no. 2-2010, § 3(16) (requiring a seventy-two ambient noise level evaluation); JEFFERSON HILLS, PA., ORDINANCE no. 814 (July 12, 2010), https://www.pdfFiller.com/en/project/130271573.htm?f_hash=477fbc&reload=true (noise curfew and limit) (pending ordinance never adopted, codified with differences in language at JEFFERSON HILLS, PA. ORDINANCE no. 833, § 4(2)(I) (noise management plan)); NORTH STRABANE TOWNSHIP, PA., ORDINANCE no. 368, § 14 (2016), <http://ecode360.com/documents/NO2412/source/LF931614.pdf> (requiring engine mufflers); PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(P) (noise control); Bd. of Trs. of the Town of Erie Res. no. 12-74 (Colo. 2012), <http://www.erieco.gov/documentcenter/view/4736> (noting best management practices, elaborated in Appendix A of attached Memorandum of Understanding).

432. See, e.g., ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01(A)(14), (A)(28), (A)(31), (C)(1), (I) (describing pond design and landscaping features; storage tank regulations; saltwater disposal lines); AZTEC, N.M., CITY CODE ch. 15, art. III, § 15-30 (2013), <http://www.aztecnm.gov/citycode/chapter15-oilgas.pdf> (storage tank regulations); BUFFALO TOWNSHIP, PA., ZONING ORDINANCE art. 3, § 331 (requiring heavy industry to provide a description of disposal methods); MIDLOTHIAN, TEX., CODE OF ORDINANCES ch. 4, art. 40.6, § 4.06.13 (specifying discharge regulations); MOUNT PLEASANT TOWNSHIP, PA., CODE ch. 171, art. 1, § 171.10, ch. 200, art. XII, § 200-103.5(B)(13), <http://ecode360.com/14960721> (noting a liability coverage requirement); OTERO COUNTY, N.M., ORDINANCE no. 02-05 (2005), https://web.archive.org/web/20110813193603/http://co.otero.nm.us/Oil%20&%20Gas%20Ordinance/O&GDocs/Ord02-05_WORK.pdf (draft ordinance describing oil cleanup and disposal, accident report and spills); PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(E)(5) (requiring water testing); SOUTH FAYETTE TOWNSHIP, PA., CODE ch. 240, art. XV § 240-95(A)(54), (A)(56) (2016), <http://ecode360.com/11616851> (pond management); Bd. of Trs. of the Town of Erie Res. no. 12-74 (Colo. 2012), <http://www.erieco.gov/documentcenter/view/4736> (attached Memorandum of Understanding describes responsible products program and best management practices); MCKENZIE COUNTY COMPREHENSIVE PLAN, *supra* note 407, at 1-4, 2-48 (natural resources management plan).

433. See ARLINGTON, TEX., ORDINANCE no. 11-068 art. VII, § 7.01(A)–(C), (H), (L) (describing minimal interference initiatives; visual blight reduction; setbacks; landscaping; gates requirements); BEDFORD, TEX., CODE OF ORDINANCES pt. 1, ch. 79, art. I § 79-6 (2017), https://www.municode.com/library/tx/bedford/codes/code_of_ordinances?nodeId=PTIICCOOR_CH79GADRPR (seismic survey regulations); CECIL TOWNSHIP, PA., ORDINANCE no. 2-2010, § 3(3), (5),

Soil and Geology: Earthquakes and Ground Vibration ⁴³⁴
Soil and Geology: Erosion and Sedimentation ⁴³⁵
Soil and Geology: Increased Sand Mining and Processing ⁴³⁶
Soil and Geology: Soil Compaction ⁴³⁷
Water Resources: Strain on Water Infrastructure and Public Utilities ⁴³⁸

V. OVERLAP BETWEEN LOCAL CONCERNS AND LOCAL AUTHORITY

Our ongoing research has sought to identify both the positive and negative impacts of fracking. These impacts are local in nature, and their regulation falls under the umbrella of traditional local zoning authority.⁴³⁹

Positive impacts are generally economic in nature; drilling operations have been touted for creating jobs and providing desperately needed income for hardscrabble farmers who choose to lease their land.⁴⁴⁰ Fracking can also improve conditions in poor, rural municipalities that would otherwise not be able to afford to carry out functions such as fix-

(8)–(10) (minimal interference initiatives); MCKENZIE COUNTY, N.D., ZONING ORDINANCE art. III, § 3.8, art. IV, § 4.9, art. V, § 5.8 (2016), http://county.mckenziecounty.net/usrfiles/Zoning_Ordinance_9-20-2016.pdf (conditional use permits; performance standards); MIDLOTHIAN, TEX., CODE OF ORDINANCES ch. 4, art. 40.6, § 4.06.007(e) (landscaping requirements); SOUTH FAYETTE TOWNSHIP, PA., CODE ch. 240, art. XV § 240-95(A)(54)(K), (N)–(O), (T)–(U) (facility design); Bd. of Trs. of the Town of Erie Res. no. 12-74 (Colo. 2012), <http://www.erieco.gov/documentcenter/view/4736> (best management practices elaborated in Appendix A of attached MOU).

434. See, e.g., ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01(A)(6) (noting vibration control); BEDFORD, TEX., CODE OF ORDINANCES pt. 1, ch. 79, art. I, § 79-6 (seismic survey regulations); MURRYSVILLE, PA., CODE ch. 220, art. V, § 220-31(CC)(3)–(4) (2017) <http://ecode360.com/11539722> (geophysical exploration plan); PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(16), (42), (55)(0) (vibration and landslide control).

435. See, e.g., MCKENZIE COUNTY, N.D., ZONING ORDINANCE art. IV, § 4.9(1)(b), art. VI, §§ 6.1.3(3), 6.10.14; MURRYSVILLE, PA., CODE ch. 220, art. V, § 220-31(P)(7), (T)(1)(b)(1)(e), (T)(1)(c)(2), (T)(1)(d)(2), (T)(2)(g), (T)(2)(h)(2), (5) (erosion prevention and soil reclamation).

436. See, e.g., MCKENZIE COUNTY, N.D., ZONING ORDINANCE art. II, § 2.13.2, art. III, §§ 3.4.3(13), (23), 3.8.1.2(7), (14), 3.8.2.2(2), (8) (specifying bond requirements for excavation and reclamation).

437. See, e.g., ARLINGTON, TEX., ORDINANCE no. 11-068, art. V, § 5.02(C)(14) (describing a site restoration plan); FORT WORTH, TEX., ORDINANCE no. 18449-02-2009 § 15-45(D) (2009), <http://publicdocuments.fortworthtexas.gov/CSODOCS/PDF/i51koge5c5rho1n0sulvnlle/47/Ordinance%2018449-02-2009.pdf> (describing a reclamation plan); MCKENZIE COUNTY, N.D., ZONING ORDINANCE art. IV, § 4.9(1)(b), art. VI, § 6.7(2)(a) (requiring a runoff management plan).

438. See, e.g., BUFFALO TOWNSHIP, PA., ZONING ORDINANCE art. 3, §§ 307(G), 331(C) <http://buffalotownship.com/pdf/zoningordinance0209.pdf> (describing water withdrawal plan); BURLESON, TEX., CODE OF ORDINANCES ch. 14, art. VII, div. I, § 14-357(e)(10) (2017), https://library.municode.com/tx/burleson/codes/code_of_ordinances?nodeId=PTIICOOR_CH14BUBU_ARTVIIIGADREX_DIVIGE_S14-353CIMA (water needs questionnaire); FORT WORTH, TEX., ORDINANCE no. 18449-02-2009 § 15-42(A)(17) (requiring a fresh water fracture pond permit).

439. See *supra* Section IV.A.

440. RAIMI & NEWELL, *supra* note 413, at 2.

ing their roads or buying new firefighting equipment.⁴⁴¹ Further, local governments can potentially advance these functions as conditions of permitting fracking, or industry may provide for them via charitable donations to the localities in which they operate.⁴⁴² Such economic improvements may lead to increased population and property values, which in turn increase tax revenues.⁴⁴³

On the other hand, localities are concerned that fracking may also negatively impact the environment, health and safety, and sense of character of a community. Environmental concerns include water⁴⁴⁴ and air pollution,⁴⁴⁵ water depletion (especially in drought-prone areas in the West),⁴⁴⁶ nuisance effects (such as dust, odor, and noise),⁴⁴⁷ habitat fragmentation,⁴⁴⁸ and increased erosion.⁴⁴⁹ Excessive truck traffic can

441. See PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(I), (T), (U), (W) (2017), <http://www.ecode360.com/attachment/PE3557/Peters%20Township%20Zoning%20Ordinance%20-%20August%202017.pdf>.

442. See KELSEY ET AL., *supra* note 412, at 5; RAIMI & NEWELL, *supra* note 413, at 4.

443. See ECOLOGY AND ENV'T, INC., N.Y. STATE. DEP'T OF ENVTL. CONSERVATION, 002911_EG04_03_B3371, ECONOMIC ASSESSMENT REPORT FOR THE SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON NEW YORK STATE'S OIL, GAS, AND SOLUTION MINING REGULATORY PROGRAM 4-114 (Aug. 2011), http://www.dec.ny.gov/docs/materials_minerals_pdf/rdsgeisecon0811.pdf; RAIMI & NEWELL, *supra* note 413, at 4.

444. See JACKSON TOWNSHIP, PA., ORDINANCE no. 141 § IV(E) (2006), <http://www.jacksontownshippa.com/PDF%20Documents/Ordinances/Methane%20Gas%20Ordinance%20141.pdf>; SOUTH FAYETTE TOWNSHIP, PA., CODE ch. 240, art. XV § 240-95(A)(54)(f) (2016), <http://ecode360.com/11616851>.

445. CECIL TOWNSHIP, PA., ORDINANCE no. 2-2010, § 3(16)(g) (2010), https://pennstatelaw.psu.edu/file/aglaw/Ordinances/Cecil_Township_2-2010_General.pdf; MIDLOTHIAN, TEX., CODE OF ORDINANCES ch. 4, art. 40.6, § 4.06.013 (2016), <http://z2codes.franklinlegal.net/franklin/Z2Browser2.html?showset=midlothianset> note (noting location criteria and specific use permits); TOWNSHIP OF UPPER BURRELL, PA., CODE ch. 350, art. XVI, § 350-107(L)(7) (2016), <http://ecode360.com/15010205#15010205>.

446. See, e.g., MONIKA FREYMAN, HYDRAULIC FRACTURING & WATER STRESS: WATER DEMAND BY THE NUMBERS 7 (2014), http://www.colorado.edu/geography/class_homepages/geog_4501_s14/ceres_frackwaterbynumbers_021014.pdf; Michael Dillon, *Water Scarcity and Hydraulic Fracturing in Pennsylvania: Examining Pennsylvania Water Law and Water Shortage Issues Presented by Natural Gas Operations in the Marcellus Shale*, 84 TEMP. L. REV. 201, 210 (2011); Bobby Magill, *Climate Change, Fracking, Water Shortages in Northern Colorado Top Environmental Concerns in Coming Decades*, COLORADOAN (July 29, 2013, 8:45 AM), <http://www.savethepoudre.org/news-articles/climate-change-fracking-water-shortages-in-n-colorado-coloradoan-2013-07-29.pdf>.

447. See, e.g., AZTEC, N.M., CITY CODE ch. 15, art. III, § 15-30 (2013), <http://www.aztecmn.gov/citycode/chapter15-oilgas.pdf> (minimizing odor); NORTH STRABANE TOWNSHIP, PA., ORDINANCE no. 368, § 14 (2016), <http://ecode360.com/documents/NO2412/source/LF931614.pdf> (minimizing noise and light pollution).

448. Erik Kiviat, *Risks to Biodiversity from Hydraulic Fracturing for Natural Gas in the Marcellus and Utica Shales*, 1286 ANNALS OF THE N.Y. ACAD. OF SCI., May 23, 2013, at 1, 3-4; David M. Marsh & Nicole G. Beckman, *Effects of Forest Roads on the Abundance and Activity of Terrestrial Salamanders*, 14 ECOLOGICAL APPLICATIONS 1882, 1882 (2004); Alexandre Racicot et al., *A Framework to Predict the Impacts of Shale Gas Infrastructures on the Forest Fragmentation of an Agroforest Region*, 53 ENVTL. MGMT. 1023, 1026-28 (2014).

449. Matthew McBroom et al., *Soil Erosion and Surface Water Quality Impacts of Natural Gas Development in East Texas, USA*, 4 WATER 944, 945 (2012); Mary Beth Adams, et al., *Effects of Natural Gas Development on Forest Ecosystems* (2011) (Paper presented at the 17th Hardwood Forest Conference), <http://www.nrs.fs.fed.us/pubs/gtr/gtr-p-78papers/23adamsp78.pdf>.

quickly wear down local roads.⁴⁵⁰ These, as well as concerns about accidents (such as spills), may actually negatively impact property values.⁴⁵¹ Finally, the rapid population increase accompanying drilling activity—associated with waste disposal, schools, courts, jails, and emergency response services—may completely overwhelm a small locality.⁴⁵²

A. What Local Governments Can Do

Local governments may draw from their traditional zoning and police powers to regulate unwanted impacts of fracking in the same manner as they have historically regulated industrial uses and activities within their communities. Local governments may use zoning power to restrict drilling activities to certain zones (e.g. the heavy industrial zone),⁴⁵³ or an overlay zone where drilling is permitted to occur (albeit with heightened restrictions above those that exist for the underlying zone).⁴⁵⁴ Local jurisdictions may make drilling a conditional use within a zone, requiring industry to seek a special permit in order to establish an operation.⁴⁵⁵ Local governments may even ban fracking completely within a municipality's borders as long as state law does not preempt doing so.⁴⁵⁶ Municipalities may also use their police power to pass local ordinances mitigating unwanted nuisances, such as noise, dust, odors, and safety concerns.⁴⁵⁷ For example, a noise ordinance can limit the maximum decibel level of fracking operations and the hours of the day in which they are permitted to occur.⁴⁵⁸

450. NOTTINGHAM TOWNSHIP, PA. ORDINANCE no. 91, art. I, § 3 (2010), https://pennstatelaw.psu.edu/_file/aglaw/Ordinances/Nottingham_Township_No_91.pdf; TOWNSHIP OF UPPER BURRELL, PA., CODE ch. 350, art. XVI, § 350-107(K) (2016), <http://ecode360.com/15010205#15010205>.

451. NOTTINGHAM TOWNSHIP, PA., ORDINANCE No. 91, art. I, § 3; Jason Nottle, *Fracking Leaves Property Values Tapped Out*, DAMASCUS CITIZENS FOR SUSTAINABILITY (Aug. 23, 2013), <http://www.damascuscitizensforsustainability.org/2013/08/fracking-leaves-property-values-tapped-out>.

452. See *infra* Section V.B.2.

453. See text accompanying *infra* note 507.

454. Overlay zones are a generally accepted zoning mechanism that allow for a special zone, with its own unique regulations, to lie overtop the existing zoning. See, e.g., *Galveston Historical Found. v. Zoning Bd. of Adjustment*, 17 S.W.3d 414, 415 (Tex. Ct. App. 2000) (overlay zone used to impose special restrictions on signs); *Main St. Dev. Grp. v. Tinicum Twp. Bd. of Supervisors*, 19 A.3d 21, 27–28 (Pa. Commw. Ct. 2011) (“[T]he MPC does not define overlay districts, but they have become common tools of land use in Pennsylvania.”).

455. See, e.g., NORTH STRABANE TOWNSHIP, PA., ORDINANCE no. 368, § 3 (2016), <http://ecode360.com/documents/NO2412/source/LF931614.pdf>.

456. See, e.g., *Wallach v. Town of Dryden*, 16 N.E.3d 1188, 1191 (N.Y. 2014); *Town of Dryden, N.Y. Ordinance Amending Prohibition on Gas Drilling* (Aug. 2, 2011), http://dryden.ny.us/Downloads/PROPOSED_AMENDMENTS_ZONING_ORDINANCE.pdf.

457. PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(N), (O), (P) (2017), <http://www.ecode360.com/attachment/PE3557/Peters%20Township%20Zoning%20Ordinance%20-%20August%202017.pdf> (discussing noise, light, odor nuisances).

458. See, e.g., TOWNSHIP OF UPPER BURRELL, PA., CODE ch. 350, art. XVI, § 350-107(L) (2016), <http://ecode360.com/15010205#15010205> (requiring noise decibel limits during drilling operations).

Some local governments are even adopting novel nonregulatory strategies, such as memoranda of understanding⁴⁵⁹ and road maintenance agreements.⁴⁶⁰ These techniques, the efficacy of which have been debated,⁴⁶¹ serve at the very least to foster better communication and relations between the local government and industry, and can result in industry being more sensitive to the concerns of the locality in which it is drilling.⁴⁶²

Compelling case studies from localities across the United States demonstrate these strategies in practice. This Article specifically examines Erie, Colorado; McKenzie County, North Dakota; Peters Township, Pennsylvania; and Arlington, Texas. Looking closely at the specific nature of each government's strategy will show that fracking, and the tools for governing it, are essentially the same in nature as any other land use, despite difficult political circumstances and complicated technical and environmental issues. These case studies also show that jurisdictions in different political, legal, economic, social, and geologically technical contexts can develop techniques that manage the most pressing impacts of hydraulic fracturing. The following studies borrow from more detailed case studies, which can be accessed from the link in Appendix 3.

B. What Local Governments Are Doing: Case Studies

1. Erie, Colorado: A Novel Nonregulatory Approach

In Colorado, there are four classes of localities, as determined by the state legislature:⁴⁶³ cities, towns, territorial charter cities, and home rule municipalities.⁴⁶⁴ "Home rule municipalities are those that have adopted a home rule charter pursuant to Article XX of the Colorado Constitution," which grants home rule power to those localities.⁴⁶⁵ Cities have a population of over 2,000, while towns have a population of 2,000 or less.⁴⁶⁶ Territorial charter cities are those that incorporated prior to 1877 and never reorganized under the more modern statutes; only one such city remains in the state.⁴⁶⁷ Only home rule municipalities possess home rule powers; the others may exercise only the powers granted to

459. See *infra* Section V.B.1.

460. See *infra* Section V.B.3.

461. See *infra* Section V.B.1. on nonregulatory techniques in Erie, Colo.

462. See *infra* Section V.B.1. on Erie, Colo.

463. COLO. CONST. art. XIV, § 13.

464. COLO. REV. STAT. § 31-1-201 (2017); KATHLEEN M. KELLY, 1C COLORADO PRACTICE SERIES, METHODS OF PRACTICE § 54:1 (7th ed. West 2016).

465. KELLY, *supra* note 464.

466. *Id.*

467. *Id.* §§ 54:1, 54:1 n.6.

them legislatively under Colorado Revised Statutes, section 31-15-101(2).⁴⁶⁸

In home rule municipalities, all state laws continue to apply until superseded by the charters or local laws of the locality. Where a local law is challenged under the doctrine of preemption, Colorado courts will determine whether the issue the local law is seeking to regulate is of local, state, or “mixed” local and state concern.⁴⁶⁹ If the matter is purely local, the home rule municipality’s ordinance will supersede the state law.⁴⁷⁰ On the other hand, if the matter is found to be of state concern, state law will supersede the local regulation.⁴⁷¹ If the matter is of mixed state and local concern, then both the state and local governments can adopt laws regulating it,⁴⁷² but in the case of a conflict, state law will supersede the local law.⁴⁷³ Determining whether a matter is of local, state, or mixed concern is an issue for the courts, who must balance fact and policy in making their determination.⁴⁷⁴ The courts admit that often these categories can even merge, and thus each determination is made on an ad hoc basis using a multi-factor test.⁴⁷⁵ This makes for a rather litigious area of the law, and provides the backdrop for the raging fracking debate that has been ongoing for years within the state. In May 2016, the Colorado Supreme Court finally resolved the fiercely contested issue of whether local governments have the right to enact drilling moratoriums; the court established that such moratoriums conflict with—and are therefore preempted by—state oil and gas law.⁴⁷⁶

The town of Erie, Colorado, is located in the northern part of the state, nestled in the Front Range of the Rocky Mountains. It currently has 25,000 residents and expects its population to increase by forty percent

468. COLO. REV. STAT. § 31-15-101(2); KELLY, *supra* note 464, § 54:2; *see also* City of Sheridan v. City of Englewood, 609 P.2d 108, 109 (Colo. 1980); City of Aurora v. Bogue, 489 P.2d 1295, 1296 (Colo. 1971); Svaldi v. City of Lakewood, 536 P.2d 331, 332 (Colo. App. 1975).

469. KELLY, *supra* note 464, § 54:2.

470. *Id.*; Vela v. People, 484 P.2d 1204, 1205 (Colo. 1971).

471. City of Commerce City v. State, 40 P.3d 1273, 1279 (Colo. 2002).

472. John E. Hayes & Kristy M. Hartl, *Home Rule in Colorado: Evolution or Devolution*, 33 COLO. LAW. 61, 62 (2004).

473. *Id.*; *see* City of Commerce City, 40 P.3d at 1279.

474. *See* City & Cty. of Denver v. Qwest Corp., 18 P.2d 748, 754–55 (Colo. 2001); Hayes & Hartl, *supra* note 472, at 62 (quoting Town of Telluride v. Lot Thirty-Four Venture, LLC, 3 P.3d 30, 37 (Colo. 2000)).

475. City of Commerce City, 40 P.3d at 1278; City & Cty. of Denver v. State, 788 P.2d 764, 767–68 (Colo. 1990).

476. City of Longmont v. Colo. Oil & Gas Ass’n, 369 P.3d 573, 585 (Colo. 2016); *see also* Cathy Proctor, *Colorado Supreme Court Rules on Local Fracking Bans*, DENV. BUS. J. (May 3, 2016, 8:30 AM), https://www.bizjournals.com/denver/blog/earth_to_power/2016/05/colorado-supreme-court-rules-on-local-fracking.html; Caitlin Hendee, *Colorado Attorney General Threatens Boulder County with Legal Action Over Oil and Gas Moratorium*, DENV. BUS. J. (Jan. 27, 2017, 4:27 PM), <http://www.bizjournals.com/denver/news/2017/01/26/colorado-attorney-general-threatens-boulder-county.html> (demonstrating that some holdouts are still not in compliance with the court’s ruling; for example, Boulder County, Co. voted in December 2016 to extend its drilling moratorium through May 1, 2017, and the state Attorney General threatened to bring suit against the county to force compliance).

by 2025.⁴⁷⁷ Erie's median age is thirty-seven and its median household income is \$112,000.⁴⁷⁸ The debate over hydraulic fracturing in Erie, Colorado, began in the summer of 2012 over a drill pad sited near Red Hawk Elementary School; Erie residents were concerned by the proximity of the well pad to the school and residential homes, as well as the noise that emanated from the site.⁴⁷⁹ Though the site complies with all state setback and operation requirements, the rig generated significant local resistance against future drilling sites. The impacts of greatest concern to Colorado residents include water consumption and pollution; waste; air pollution; leaking wells and faulty containment equipment (a particular problem in recent large flooding events); and insufficient siting and setback requirements.⁴⁸⁰

In an attempt to address residents' concerns, Erie town administrators decided to take a nonregulatory approach and entered into negotiations with Encana and Anadarko, the two major companies running drilling operations in northern Colorado.⁴⁸¹ This approach is in stark contrast to other Colorado towns, such as Longmont, whose residents instead voted to outright ban fracking from its borders, but lost the fierce legal battle to establish its right to impose a moratorium.⁴⁸² The resulting Memorandum of Agreements (MOA) between Erie, Encana, and Anadarko requires companies to use best practice techniques such as a wider setback than the state requires; vapor recovery units; a noise, light, and dust mitigation plan; and steel-rimmed berms around tanks at the well site.⁴⁸³ When additional issues surfaced after drilling commenced (such as noise and vibration problems), Erie's Town Board continued to engage with the drilling companies and seek more mitigation measures instead of banning the operations.⁴⁸⁴ Due to the collaborative approach taken by town administrators and industry representatives—and especially in light of the Colorado Supreme Court's decision that local moratoriums are preempted by state law—Erie's MOU offers a potentially constructive pathway forward for other small towns confronted with the natural gas industry. At a minimum, the unique effort of crafting a MOU has created a better relationship between the town and industry, in which the town retains a significant amount of negotiating power.

477. See *Quick Facts*, TOWN OF ERIE, COLO., <https://www.erieco.gov/240/Quick-Facts> (lasted visited Oct. 5, 2017).

478. *Id.*; *Town of Erie 2017 Community Profile*, TOWN OF ERIE, COLO., <https://www.erieco.gov/DocumentCenter/Home/View/43> (last updated Jan. 27, 2017).

479. Interview by Avana Andrade with Fred Diehl, Assistant to the Town Administrator, Erie, Colo. (Dec. 2, 2014).

480. *Id.*

481. Bd. of Trs. of the Town of Erie, Res. no. 12-74 (Colo. 2012), <http://www.erieco.gov/documentcenter/view/4736>.

482. See *City of Longmont v. Colo. Oil & Gas Ass'n*, 369 P.3d 573, 585 (Colo. 2016).

483. TOWN OF ERIE, COLO., ORDINANCE no. 21-2015 (2015), <http://www.erieco.gov/DocumentCenter/View/7078>.

484. Mark Jaffe, *Erie Rejects Fracking Freeze*, DENV. POST (Apr. 26, 2016, 12:28 AM), <http://www.denverpost.com/2015/01/27/erie-rejects-fracking-freeze>.

2. McKenzie County, North Dakota: A Rural Hybrid Approach

In North Dakota, authority is statutorily granted to all municipalities to regulate a wide variety of industries and uses, including passing ordinances (though the power to zone is not a power explicitly granted).⁴⁸⁵ All municipalities hold the same powers as townships.⁴⁸⁶ For a proposed municipal corporation to become a city, it must have a territory of under four square miles in area.⁴⁸⁷ Cities of under 500 inhabitants may incorporate “under the council or modern council forms of government,” while cities of 500 or more inhabitants may incorporate under either the council, modern council, or commission forms of government.⁴⁸⁸

Home rule authority is statutorily granted to cities through the enabling clause found in North Dakota Century Code § 40-05.1-01: “Any city may frame, adopt, amend, or repeal home rule charters”⁴⁸⁹ The powers of home rule cities are laid out in § 40-05.1-06 and notably include both the authority “[t]o provide for the adoption, amendment, and repeal of ordinances, resolutions, and regulations to carry out its governmental and proprietary powers and to provide for public health, safety, morals, and welfare,”⁴⁹⁰ and “[t]o provide for zoning, planning, and subdivision of public or private property.”⁴⁹¹

In a similar vein, counties in North Dakota are statutorily established entities⁴⁹² that are also granted the power (if they choose to exercise it) to become home rule entities.⁴⁹³ Their authority, much like cities, includes the ability to pass, amend, and repeal ordinances⁴⁹⁴ as well as engage in planning and zoning for the health and welfare of their citizens.⁴⁹⁵

With a pre-boom population of 6,360 people, McKenzie County has been rapidly growing, recently landing the title of fastest growing non-metropolitan county in the country.⁴⁹⁶ Watford City’s population more than quintupled, growing from less than 1,500 residents in 2010 to over 10,000 residents in 2014.⁴⁹⁷ This phenomenal growth rate is one of the

485. N.D. CENT. CODE § 40-05-01 (2017).

486. *Id.* § 40-05-10.

487. *Id.* § 40-02-01.

488. *Id.*

489. *Id.* § 40-05.1-01.

490. *Id.* § 40-05.1-06(9).

491. *Id.* § 40-05.1-06(13).

492. *Id.* § 11-01-01.

493. *Id.* § 11-09.1-01.

494. *Id.* § 11-09.1-05(7).

495. *Id.* § 11-09.1-05(9).

496. Stephanie Norman, *County Is No. 1 in Nation for Population Growth*, MCKENZIE CTY. FARMER (Apr. 15, 2014), <http://www.watfordcitynd.com/?id=10&nid=2665>.

497. RICHARD G. NEWELL & DANIEL RAIMI, DUNN COUNTY AND WATFORD, CITY NORTH DAKOTA: A CASE STUDY OF THE FISCAL EFFECTS OF BAKKEN SHALE DEVELOPMENT 2, 10–11 (2016), <https://energy.duke.edu/sites/default/files/attachments/5.%20A%20case%20study%20of%20the%20>

impacts that the county has been most focused on mitigating. The county seeks to preserve its agrarian, “wholesome” community character, despite this “instant sprawl.”⁴⁹⁸ This “instant sprawl” describes the “man camps,” or miles of temporary housing units constructed for drill site workers that have popped up within a twenty-mile radius of Watford City in the few years since the shale boom has taken off.⁴⁹⁹ County officials have utilized a hybrid approach to address these growth concerns; the traditional zoning process was used to develop a Comprehensive Plan and Zoning Ordinance, while nonregulatory collaborations between the county, surrounding counties, and other stakeholders have assessed and planned for infrastructure and service needs.

The Comprehensive Plan expresses the community’s vision for future development and features key priorities for guiding policy making. The county used the Comprehensive Plan to articulate an overarching goal of preserving the integrity of the rural communities while reaping the benefits of development, focusing on broad categories of concern: economic development; provision of government services; stewardship of resources; land use and adequate transportation; recreation; and housing.⁵⁰⁰

The Zoning Ordinance creates zoning districts with district-specific restrictions on development, though it allows all nonconforming uses at the time of adoption to continue.⁵⁰¹ The Ordinance focuses on allowed and conditional uses in the county and includes general restrictions such as requiring approved on-site sewage systems and road access for subdivisions.⁵⁰² Importantly, temporary workforce housing is considered a conditional use and is subject to significant regulation.⁵⁰³ In contrast to the other localities featured as case studies in this Article, the McKenzie County Ordinance places minimal restrictions on oil and gas development, avoiding regulations like sound restrictions that might be more common in more urbanized areas.⁵⁰⁴ Yet an extensive portion of the ordinance is devoted to addressing wind energy siting, extensive permitting

fiscal%20effects%20of%20Bakken%20shale%20development%20FINAL.pdf; see U.S. Census Bureau, *Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015*, AM. FACT FINDER, <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk> (last visited Oct. 5, 2017); see also Tom Haines, *What If Your Small Town Suddenly Got Huge?*, ATLANTIC (Sept. 12, 2014), <https://www.theatlantic.com/business/archive/2014/09/what-if-your-small-town-suddenly-got-huge/379536>.

498. Interview by Christopher Halfnight with Gene Veeder, Director, Economic Development, McKenzie County, N.D. Job Development Authority and Tourism Bureau (Dec. 1, 2014).

499. *Id.*

500. See, e.g., MCKENZIE COUNTY COMPREHENSIVE PLAN, *supra* note 407, at 1-4; Kate Ruggles, *County Zone Plan Approved*, MCKENZIE CTY. FARMER (Mar. 27, 2013), <http://www.watfordcitynd.com/?id=10&nid=2118>.

501. MCKENZIE COUNTY, N.D., ZONING ORDINANCE art. II, § 2.6 (2016), http://county.mckenziecounty.net/usrfiles/Zoning_Ordinance_9-20-2016.pdf.

502. See, e.g., *id.* at art. III, § 3.9.3, art. IV, § 4.1.

503. *Id.* at art. 4, § 4.8.

504. *Id.* at art. 1, § 1.3.

requirements, public hearings, setbacks, and post-leasing restoration of property—a contrast that mostly results from state authority over oil and gas regulation but also reflects local priorities.⁵⁰⁵

McKenzie County's nonregulatory strategies to address the increasing strains on local government infrastructure and services from the rapid population boom have primarily focused on assessing and prioritizing infrastructure and service needs, and then creating infrastructure and expanding staff to meet those needs. The county joined with eighteen other counties and entities to form Vision West ND, a consortium of local interests seeking to improve the regional economy, and released an Economic Development Strategic Plan, which included topics such as business retention, health care, environmental restoration, and traffic management.⁵⁰⁶

Although the oil boom in McKenzie County has dramatically slowed over the past two years due to a sharp drop in oil prices,⁵⁰⁷ the Trump Administration's focus on encouraging domestic energy production may spur another uptick in fracking.⁵⁰⁸ Though the future for McKenzie County is uncertain, their planning and zoning efforts (emphasizing controlled growth), diversification of the economy, and preservation of community character will serve them well going forward, and remain a prime example for local governments striving to achieve a balanced and adaptive approach to the region's development.

3. Peters Township, Pennsylvania: A Regulatory Approach

Pennsylvania municipalities have general authority to regulate for the wellbeing of their communities.⁵⁰⁹ However, the Pennsylvania Oil and Gas Law explicitly preempts certain local control over fracking; effectively, the law prevents localities from regulating how fracking occurs.⁵¹⁰ For example, local governments cannot mandate the thickness of well casings or the type of equipment that drillers use.⁵¹¹ Despite these

505. *Id.* at art. 1–6.

506. MCKENZIE CTY., N.D., ECONOMIC DEVELOPMENT STRATEGIC PLAN (June 2013), http://www.visionwestnd.com/pdf/strategic_plans/McKenzie%20County%20Final.pdf.

507. Ernest Scheyder, *In North Dakota's Oil Patch, A Humbling Comedown*, REUTERS INVESTIGATES (May 18, 2016, 2:00 PM), <http://www.reuters.com/investigates/special-report/usa-northdakota-bust>.

508. *An America First Energy Plan*, WHITE HOUSE, <https://www.whitehouse.gov/america-first-energy> (last accessed Sept. 1, 2017) (“The Trump Administration is committed to energy policies that lower costs for hardworking Americans and maximize the use of American resources, freeing us from dependence on foreign oil.”); *see also* Sharma, *supra* note 12.

509. Pennsylvania Municipalities Planning Code Act of 1968, Pub. L. 805, No. 247, art. VI, § 603 (2005), <http://mpc.landuselawinpa.com/MPCCode.pdf> (enabling legislation that empowers local governments to enact, amend, and repeal zoning ordinances in order to regulate for the health, safety, and welfare of their citizens).

510. *See* Huntley & Huntley, Inc. v. Borough Council, 964 A.2d 855, 868 (Pa. 2009); *see also* Range Res.-Appalachia, LLC v. Salem Twp., 964 A.2d 869, 875, 877 (Pa. 2009); *supra* Section II.A.

511. *Range Res.-Appalachia*, 964 A.2d at 875.

state-level limitations, Pennsylvania localities do have the legal authority to regulate where fracking may take place.⁵¹²

In 2012, the state government tried to limit this local authority over fracking when it passed Act 13.⁵¹³ Peters Township was among a group of townships and individuals that challenged the law, arguing that its restrictions on local power were unconstitutional.⁵¹⁴ The resulting 2013 Pennsylvania Supreme Court decision in *Robinson Township v. Commonwealth*⁵¹⁵ overturned § 3304 of Act 13 and affirmed local authority to regulate the location of fracking operations, with certain limitations.⁵¹⁶ The Pennsylvania Supreme Court affirmed the Commonwealth Court's holding that § 3304 violates "substantive due process . . . because it allows incompatible uses in zoning districts and does not protect the interests of neighboring property owners from harm, alters the character of the neighborhood, and makes irrational classifications."⁵¹⁷ Further, the court held that § 3304 violates the environmental rights provision of the Pennsylvania constitution because "a new regulatory regime permitting industrial uses as a matter of right in every type of pre-existing zoning district [including residential] is incapable of conserving or maintaining the constitutionally-protected aspects of the public environment and of a certain quality of life."⁵¹⁸

Peters Township, located in Western Pennsylvania, is heavily residential and relatively wealthy (especially compared to its neighboring townships), with a population of 22,143 and median household income of \$108,500.⁵¹⁹ While the majority of wealthy community members would like to see Peters Township ban hydrofracking—as they harbor strong concerns about negative environmental, road, and property value impacts—the Pennsylvania Municipalities Planning Code does not appear to permit local governments to completely ban a legitimate use.⁵²⁰ Thus, the township has used the traditional zoning process to regulate the location of drill sites, compressor stations, and processing stations, as

512. *Huntley & Huntley*, 964 A.2d at 864.

513. Act No. 13 of Feb. 14, 2012, Pub. L. 87, No. 13 (codified at 58 PA. CONS. STAT. §§ 2301–3504 (2017)).

514. Jason Cato, *Peters Residents Opposed to Fracking Turn Out for Public Hearing*, TRIBLIVE (Jan. 19, 2015, 9:21 PM), <http://triblive.com/news/adminpage/7595230-74/drilling-peters-ordinance>.

515. 83 A.3d 901, *aff'g* 52 A.3d 463 (Pa. 2002).

516. *Id.* at 980–83 (Pa. 2013) (reaffirming the holdings in *Huntley* and *Range Resources*, which Act 13 had directly contravened).

517. *Robinson Twp. v. Commonwealth*, 52 A.3d 463, 485 (Pa. Commw. Ct. 2012), *aff'd*, 83 A.3d at 901.

518. *Robinson Twp.*, 83 A.3d at 979.

519. *QuickFacts: Peters Township, Washington County, Pennsylvania*, U.S. CENSUS BUREAU, <https://www.census.gov/quickfacts/fact/table/peterstownshipwashingtoncountypennsylvania/PST045216> (last visited Oct. 5, 2017).

520. Pennsylvania Municipalities Planning Code Act of 1968, Pub. L. 805, No. 247, art. VI, § 603(b), (i) (2005), <http://mpc.landuselawinpa.com/MPCCode.pdf>.

well as mitigate impacts including visual blight, noise and odor pollution, truck traffic and wear on local roads, and potential safety hazards.

The township, while regulating under the mandates of the now-overturned provision of Act 13, originally crafted a Mineral Extraction Ordinance, which regarded drilling as a “conditional use” that the Township’s Planning Commission must approve prior to extraction.⁵²¹ The ordinance modified the township’s existing zoning code by creating a “Mineral Extraction Overlay Zone,” which the township can float over the existing zoning to permit drilling in areas over forty acres that are accessible via an existing road.⁵²² All types of drilling activity and stations are considered industrial uses under the zoning code. The regulations require setbacks; notification,⁵²³ signage, and fencing requirements;⁵²⁴ drilling noise decibel limits;⁵²⁵ minimization of visual blight,⁵²⁶ lighting,⁵²⁷ and dust/vibrations/odor;⁵²⁸ road maintenance and repair requirements,⁵²⁹ and pre- and post-drilling water testing,⁵³⁰ all with the intent of mitigating to the fullest extent possible the negative impacts of drilling on both community members and the environment.

To ensure compliance with the 2013 *Robinson Township* decision,⁵³¹ the township reviewed and amended its ordinance in January

521. PETERS TOWNSHIP, PA., ORDINANCE No. 737 (Aug. 8, 2011), http://www.peterstownship.com/vertical/sites/%7B3BE5B086-2A15-4083-A63D-16B3DD03C8DD%7D/uploads/Minera_Extraction_Ord_final_version_737_8-2-11.pdf (current version at PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55) (2017), <http://www.ecode360.com/attachment/PE3557/Peters%20Township%20Zoning%20Ordinance%20-%20August%202017.pdf>).

522. PETERS TOWNSHIP, PA., ZONING ORDINANCE ch. 27, pt. 3, § 303(A)(1), pt. 5 § 504(A), pt. 7 § 713(C) (2016), [http://www.peterstownship.com/vertical/sites/%7B3BE5B086-2A15-4083-A63D-16B3DD03C8DD%7D/uploads/Zoning\(1\).pdf](http://www.peterstownship.com/vertical/sites/%7B3BE5B086-2A15-4083-A63D-16B3DD03C8DD%7D/uploads/Zoning(1).pdf), *repealed by* PETERS TOWNSHIP, PA., ZONING ORDINANCE §§ 400.00–.1200 (2017).

523. PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(T) (2017), <http://www.ecode360.com/attachment/PE3557/Peters%20Township%20Zoning%20Ordinance%20-%20August%202017.pdf>.

524. *Id.* § 440.602(55)(T).

525. *Id.* § 440.602(55)(P)(1) (explaining that noise regulations are robust; after establishing a pre-drilling noise level baseline, the drilling cannot exceed this ambient noise level by more than ten decibels from the hours of 7:00am-9:00pm, and not by more than five decibels between 9:00pm and 7:00am); *id.* § 440.602(55)(P)(2) (stating that in order to accommodate the “fluctuations” in drilling activities, the township also created a “sliding scale which provides adjustments in the permitted level of noise generated during operations to create flexibility in the regulations and prevent repeated violations.”); *see also id.* § 440.602(16)(J) (explaining that the Township reserves the right to require operators to use devices such as sound walls, acoustical blankets, and mufflers, to ensure compliance with the permitted noise levels).

526. *See* PETERS TOWNSHIP, PA., ZONING ORDINANCE § 440.602(55)(U)(V) (requiring that the operator paint machinery in “earth tones,” and requiring fencing and/or landscape buffering to minimize the visual impact of fracking at the streetscape).

527. *Id.* § 440.602(55)(N) (stating that lighting may not shine on adjacent public or private property, and must point downward to illuminate only the drilling site).

528. *Id.* § 440.602(55)(O).

529. *Id.* § 440.602(55)(I).

530. *Id.* § 440.602(55)(E).

531. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, *aff’d* 52 A.3d 463 (Pa. 2002).

2015.⁵³² The township eliminated its mineral extraction overlay district, and instead now permits fracking to occur in its Light Industrial District.⁵³³ The ordinance still retains all of its provisions relating to environmental, health, and safety concerns. These specific requirements for drilling are valuable best practices that other localities may consider in order to regulate some of the impacts of fracking.⁵³⁴

4. Arlington, Texas: An Urban Hybrid Approach

Texas first enacted laws permitting the incorporation of cities in the 1850s.⁵³⁵ In the early 1900s, the Home Rule Enabling Act was created and modified, permitting cities to designate zones and districts wherein they could regulate size, height, bulk, and use of structures in furtherance of the public welfare.⁵³⁶ In 1927, the basis of Texas's modern Local Government Code was laid with the passage of the Zoning Act, a comprehensive piece of legislation outlining the mechanisms by which local governments could exercise their authority.⁵³⁷ Today, the authority for Texas localities' authority to zone is found in Chapter 211 of the Local Government Code.⁵³⁸

There are three types of Texan municipalities: general law, municipal home rule, and those chartered by special legislation.⁵³⁹ Each locality's governmental structure and powers are dependent on its classification; thus, a general-law city is bound by the general laws of the state, a home rule city is guided by its charter, and a special-law city regulates pursuant to the special legislative act that created it.⁵⁴⁰ There are three subtypes of general-law municipality: Types A, B, and C.⁵⁴¹ Each has its own distinct requirements for incorporation, such as population and terri-

532. PETERS TWP. PLANNING COMM'N, MEETING MINUTES FOR JAN. 15, 2015, at 3–5 (Pa. 2015), http://www.peterstownship.com/vertical/sites/%7B3BE5B086-2A15-4083-A63D-16B3DD03C8DD%7D/uploads/Planning_Minutes_2015-01-15.pdf (approving draft mineral extraction ordinance).

533. *Id.*

534. PETERS TOWNSHIP, PA., ORDINANCE no. 804 (Sept. 26, 2016), <http://www.ecode360.com/documents/PE3557/source/LF926970.pdf>.

535. Act of Mar. 15, 1875, 1875 Tex. Gen. Laws 113 (granting authority to incorporate Type A cities); Act of Jan. 27, 1858, 1858 Tex. Gen. Laws 69 (allowing the incorporation of Type B cities); DAVID B. BROOKS, 23 TEXAS PRACTICE SERIES: MUNICIPAL LAW AND PRACTICE § 21.01 (2d ed. 2016).

536. Act of Apr. 2, 1921, 1921 Tex. Gen. Laws 169; BROOKS, *supra* note 535.

537. Act effective of June 14, 1927, 1927 Tex. Gen. & Spec. Laws 424; BROOKS, *supra* note 535.

538. TEX. LOC. GOV'T CODE ANN. § 211.001 (West 2016); BROOKS, *supra* note 535, § 21.01.

539. BROOKS, *supra* note 535, § 3.03; *see also* LOC. GOV'T § 5.001 (Type A); LOC. GOV'T § 5.002 (Type B); LOC. GOV'T § 5.003 (Type C); LOC. GOV'T § 5.004 (home rule); LOC. GOV'T § 5.005 (special-law).

540. LOC. GOV'T § 1.005; BROOKS, *supra* note 535, § 3.03.

541. LOC. GOV'T § 6.001 (authority to incorporate as a Type A municipality); LOC. GOV'T § 7.001 (authority to incorporate as a Type B municipality); LOC. GOV'T § 8.001 (authority to incorporate as a Type C municipality).

tory size requirements.⁵⁴² Cities with a population of over 5,000 may vote to adopt their own charter and become home rule cities.⁵⁴³

Arlington, Texas, is a home rule city⁵⁴⁴ of 392,772 people, with a median household income of \$53,6326, and is located inside of the nation's fastest-growing metroplex.⁵⁴⁵ While local officials at first thought fracking was a temporary phenomenon, it quickly became clear that fracking would become a permanent industry.⁵⁴⁶ Local citizens and the city are specifically concerned with avoiding state preemption (a constantly-looming issue in Texas); mitigating noise pollution;⁵⁴⁷ and ensuring the safe operation of heavy industry in a dense urban setting, such as through underground pipe management.⁵⁴⁸

The city has utilized a hybrid approach of engaging in the traditional zoning practice of passing a comprehensive ordinance—which requires multiple layers of approval for fracking to occur and contains clear guidelines for underground pipe laying, roads, and water use—as well as the nonregulatory approach of developing close working relationships through constant, symmetrical communication between enforcement staff and operators. The city has also instituted a call system to coordinate calls from operators and residents.⁵⁴⁹

Arlington's ordinance requires drillers to obtain a special use permit (SUP);⁵⁵⁰ approval of the permit is a multistep process which includes a neighborhood meeting, a gas well permit application, and a public City Council meeting.⁵⁵¹ The system reduces the administrative burden by allowing for entire "drill zones," which contain multiple well sites, to go through the approval process. Before a zone is approved, it must comply

542. LOC. GOV'T § 6.001 (authority to incorporate as a Type A municipality); LOC. GOV'T § 7.001 (authority to incorporate as a Type B municipality); LOC. GOV'T § 8.001 (authority to incorporate as a Type C municipality); LOC. GOV'T § 9.001 (adoption or amendment of Home Rule charter).

543. TEX. CONST. art. XI, § 5; LOC. GOV'T § 5.004.

544. See CITY OF ARLINGTON, TEX., CITY CHARTER (2015), <http://www.arlington-tx.gov/cityattorney/wp-content/uploads/sites/15/2014/05/CHARTChapter.pdf>.

545. *QuickFacts: Arlington, Texas*, U.S. CENSUS BUREAU, <http://www.census.gov/quickfacts/table/PST045215/4804000> (last visited Oct. 5, 2017).

546. Interview by Becky Gallagher, Yale Center for Law & Policy, with James Parajon, Deputy City Manager for Economic Development and Capital Investment, City of Arlington, Tex. (May 19, 2014) [hereinafter Interview by Becky Gallagher with James Parajon].

547. ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01(F) (2011), <http://www.arlington-tx.gov/cityattorney/wp-content/uploads/sites/15/2014/05/GasDrilling-Chapter.pdf>.

548. *Id.* § 7.01(J).

549. Interview by Becky Gallagher, Yale Center for Law & Policy, with Collin Gregory, Gas Well Coordinator, City of Arlington, Tex. (Nov. 18, 2014) [hereinafter Interview by Becky Gallagher with Collin Gregory].

550. CMTY. DEV. & PLANNING, CITY OF ARLINGTON, TEX., APPLICATION FOR GAS DRILLING AND PRODUCTION (2012), <http://www.arlington-tx.gov/cdp-gaswells/wp-content/uploads/sites/44/2014/12/Gas-Drilling-Production-Application.pdf>.

551. *Permitting Process*, ARLINGTON GAS WELL DRILLING, <http://www.arlington-tx.gov/cdp-gaswells/applications-and-permits/permitting-process> (last accessed Oct. 5, 2017).

with setback restrictions, be approved at a public meeting, and be fully licensed.⁵⁵² If the drill zone is approved, then all of the well sites within it are automatically approved.⁵⁵³ Once approved, the site is subject to frontage and setback requirements, ambient noise mitigation measures, water use and pollution regulations, road use restrictions, and charges for damages.⁵⁵⁴ Further, drillers must submit an underground pipe plan.⁵⁵⁵

Arlington's nonregulatory approach includes putting in place a three-person full-time fracking team, which does on-site inspections, processes and reviews documentation, and responds to complaints and calls from drillers and neighbors on a daily basis.⁵⁵⁶ An assistant director oversees the drilling program, and city administrative staff also supports the team.⁵⁵⁷ These dedicated staff and resources are intended to help the city maintain close working relationships with operators and ensure that drilling is safely conducted in a manner compliant with the city's ordinance.

The city hopes its hybrid approach—a comprehensive ordinance combined with funding the resources necessary for enforcement staff to cultivate close but professional relationships with both industry and neighbors—will allow it to retain its authority over local drilling.⁵⁵⁸ Whether or not state authority ultimately preempts the ordinance, the carefully worded provisions and dedication of the city to fund the execution of its regulations are certainly best practices for other local governments to emulate.

The above four case studies illustrate different paths forward that localities across the country have taken in their quest to control the local impacts of hydrofracking that most greatly impact their residents. Both traditional regulatory practices—such as zoning and ordinances—as well as nonregulatory approaches, like memoranda of understanding and open channels of communication, have been effective in addressing impacts from environmental, health, and safety concerns, to sprawl containment and economic development. Localities across the United States likewise facing the effects of hydraulic fracturing on their own communities can

552. *Id.*

553. Interview by Becky Gallagher with Collin Gregory, *supra* note 549.

554. ARLINGTON, TEX., ORDINANCE no. 11-068, art. VII, § 7.01(J).

555. *Id.*

556. Interview by Becky Gallagher with Collin Gregory, *supra* note 549. The town even maintains a website for each drill site with updated information. *Gas Well Operators*, ARLINGTON GAS WELL DRILLING, <http://www.arlington-tx.gov/cdp-gaswells/operators> (last accessed Oct. 5, 2015).

557. Interview by Becky Gallagher with James Parajon, *supra* note 546; *see also Staff Information*, ARLINGTON GAS WELL DRILLING, <http://www.arlington-tx.gov/cdp-gaswells/staff> (last accessed Oct. 5, 2017).

558. *See* CITY OF ARLINGTON, TEX., FY15: CITY OF ARLINGTON 2015 PROPOSED BUDGET AND BUSINESS PLAN 179, <http://www.arlington-tx.gov/budget/wp-content/uploads/sites/19/2014/08/FY-2015-Proposed-Budget-Book-Final.pdf> (last accessed Oct. 5, 2017) (budgeting for over \$950,000 from gas well inspection fees).

inform their own processes by drawing inspiration from the best practices highlighted in these case studies.

CONCLUSION

Though many descriptive articles have been written about the growth of fracking in the United States, this Article has sought to demonstrate that local governments can regulate fracking in a manner that does not pose a risk to their local authority. Because of significant gaps in the state and federal regulatory apparatus that seem likely to continue with the Trump Administration, opportunity exists for local governments to craft regulatory and nonregulatory structures that meet the community's needs. Indeed, as our case studies and local impacts list have shown, local governments are acting to balance environmental, social, and economic risks of fracking with the benefits that this technology can bring. However, because of the legal relationship between state and local governments, local communities must beware of the risk of preemption if localities enact outright fracking bans. We believe that with more comprehensive information about the impacts of fracking, as well as regulatory and nonregulatory tools that local governments can employ, municipalities will be better able to enact policies that withstand legal scrutiny and reflect local interests.

APPENDIX 1

A full impacts list is available at the following address:

www.bit.ly/frackingdatabase

or by visiting

landuse.yale.edu

APPENDIX 2

A static version of the impacts list database is available as a PDF file at the following address:

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/02/PUBLIC-Impact-List.pdf>

APPENDIX 3

A full investigation into the four case studies—Erie, Colorado; McKenzie, North Dakota; Peters Township, Pennsylvania; and Arlington, Texas—is available at the following address:

landuse.yale.edu

or directly, by visiting the following links:

Erie, Colorado

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/01/Erie-CO-Collaborative-Case-Study.pdf>

McKenzie County, North Dakota

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/01/McKenzie-Co-ND-Collaborative-Case-Study.pdf>

Peters Township, Pennsylvania

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/01/Peters-Twp-PA-Collaborative-Case-Study.pdf>

Arlington, Texas

<http://sites.environment.yale.edu/collaborative/wp-content/uploads/sites/9/2016/01/Arlington-TX-Collaborative-Case-Study.pdf>

